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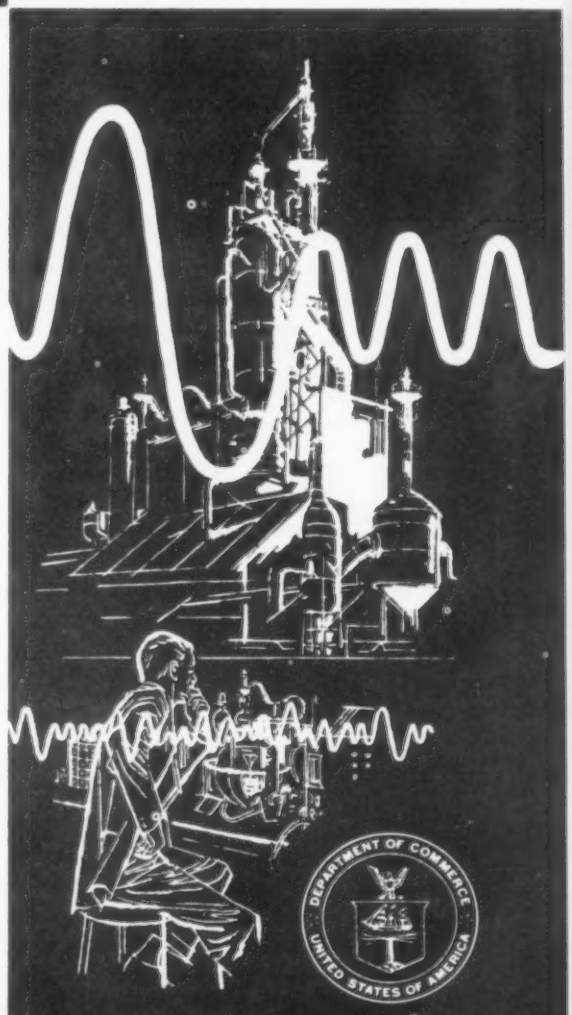

U. S. DEPARTMENT OF COMMERCE
Office of Technical Services

U.S. GOVERNMENT RESEARCH REPORTS

U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

OFFICE OF TECHNICAL SERVICES
John C. Green, *Director*

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*FLAME PROPAGATION
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*PARTICLE TRAJECTORIES
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*PARTICLES
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THE LEAST DENSITY OF A SPHERICAL SWARM OF PARTICLES: WITH APPLICATION TO ASTRONOMICAL OBSERVATIONS OF K. KORUYLESKI.
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*PARTICLES
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*PETROLEUM INDUSTRY
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CHEMISTRY OF ORGANIC SULFUR COMPOUNDS CONTAINED IN PETROLEUMS AND PETROLEUM PRODUCTS.
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*PHOTOELECTRIC CELLS
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*PHOTOELECTRIC CELLS
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A NUCLEAR-PHOTON ENERGY CONVERSION STUDY. PHOTOVOLTAIC CONVERTER. PHOSPHORS. SOURCE-PHOSPHOR GEOMETRY. TEMPERATURE RESTRICTIONS ON POWER SOURCE GEOMETRY. STACKED POWER CELLS.
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*PHOTOELECTRIC EFFECT
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*PHOTOELECTRIC MATERIALS
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HALL EFFECT MEASUREMENTS IN INSULATORS, A 'TIME-OF-FLIGHT' METHOD OF STUDYING CARRIER TRANSPORT IN INSULATORS, A GENERAL ANALYSIS OF UNIPOLAR STEADY STATE SPACE CHARGE LIMITED CURRENTS IN INSULATORS, ORGANIC SEMICONDUCTORS, AND CDS ARE TOPICS INVESTIGATED IN PHOTOCONDUCTOR RESEARCH.
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AD-295 895 DIV. 8

*PHOTONS
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A NUCLEAR-PHOTON ENERGY CONVERSION STUDY. PHOTOVOLTAIC CONVERTER. PHOSPHORS. SOURCE-PHOSPHOR GEOMETRY. TEMPERATURE RESTRICTIONS ON POWER SOURCE GEOMETRY. STACKED POWER CELLS.
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*PHOTOSENSITIVITY
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*PHOTOSENSITIVITY
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*PHYSOSTIGMINE
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*PLASMA PHYSICS
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*PLASMA PHYSICS
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*PLASMA PHYSICS
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*PLASTIC FLOW
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*PLASTICITY
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AD-295 623 DIV. 14

*PLASTICS
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FABRICATION OF TRANSPARENT SKIN AND BLISTER PACKAGING FOR STEEL PANELS AND OTHER SMALL ITEMS BY VACUUM FORMING AND ELECTRONIC SEALING EQUIPMENT.
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***PLASTICS**
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***PLASTICS**
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***PLATINUM**
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***POLARIZATION**

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***POLYMERIZATION**
GAMMA RAYS

POLYMERIZATION OF ALLYL MONOMERS BY MEANS OF GAMMA RADIATION. POLYMERIZATION RATES AND SOLUBILITIES OF THE POLYMERS ARE GIVEN.
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***POLYMERS**
ALLYL RADICALS

POLYMERIZATION OF ALLYL MONOMERS BY MEANS OF GAMMA RADIATION. POLYMERIZATION RATES AND SOLUBILITIES OF THE POLYMERS ARE GIVEN.
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***POLYMERS**
ELASTOMERS

LOW TEMPERATURE OIL RESISTANT URETHANE ELASTOMER SYNTHESIS. ELASTOMER FORMULATIONS WERE BASED ON 2 POLYETHER TRIOLS, AMINE TO HYDROXYL RATIOS WERE VARIED AND EFFECTS ON TORSIONAL MODULUS MEASURED.
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***POLYMERS**
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***POLYMERS**
MECHANICAL PROPERTIES

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***POWER REACTORS**
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***POWER SUPPLIES**
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LIQUID AMMONIA AS A SOLVENT FOR WET CELL ELECTROLYTES: ACTIVATION OF BATTERY CELLS AT -53C: DESIGN OF BATTERY CELLS: EVALUATION OF MATERIALS FOR BATTERY SEPARATORS: AND COMPOUNDS FOR USE AS CATHODES.
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***POWER SUPPLIES**
SOLAR CELLS

HIGH EFFICIENCY SI SOLAR CELLS. OBJECTIVE IS HIGH YIELDS - 70% OF THE CELLS HAVING EFFICIENCIES IN THE RANGE OF 12-14% LEADING TO A CELL COST OF $2-$3.
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SOLAR-ENERGY CONVERSION EMPLOYING CADMIUM SULFIDE. EVAPORATED CADMIUM SULFIDE FRONT WALL FILM CELL FOR APPLICATION IN A HIGH POWER-TO-WEIGHT RATIO, SOLAR ENERGY CONVERSION DEVICE.
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***POWER SUPPLIES**
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***POWER SUPPLIES**
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***PRIMARY BATTERIES**
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LIQUID AMMONIA AS A SOLVENT FOR WET CELL ELECTROLYTES: ACTIVATION OF BATTERY CELLS AT -53C: DESIGN OF BATTERY CELLS: EVALUATION OF MATERIALS FOR BATTERY SEPARATORS: AND COMPOUNDS FOR USE AS CATHODES.
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***PRIMARY BATTERIES**
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GAMMA RAYS

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***PRINTED CIRCUITS**
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***PROCESSING**
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***PROGRAMMING**
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***PROSTHETICS**
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ADIPRENE L-100 URETHANE RUBBER WAS EVALUATED AS A COSMETIC GLOVE MATERIAL AND FOUND TO HAVE EXCELLENT FLEXIBILITY AND ELASTIC PROPERTIES, HOWEVER, IT SHOWED POOR STAIN RESISTANCE. PROCESSING DIFFICULTIES WERE ENCOUNTERED.
AD-295 176 DIV. 14

***PROSTIGMINE**
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***PSYCHOMETRICS**
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***PULSE COUNTERS**
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*PULSE GENERATORS
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*PULSE GENERATORS
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C-BAND 10 WATT AND X-BAND 2.5 WATT SOLID-STATE POWER GENERATORS OPERATING AT 5 GC AND 10 GC RESPECTIVELY.
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*PULSE MODULATION
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*Q FEVER
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*QUADRUPOLE MOMENTS
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*QUALITY CONTROL
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*QUANTUM MECHANICS
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*QUANTUM MECHANICS
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*QUANTUM MECHANICS
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*QUARTZ CRYSTALS
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*RADAR
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*RADAR ECHO AREAS
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AD-295 192 DIV. 6

*RADAR ECHO AREAS
PLASMA PHYSICS

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*RADAR PULSES
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*RADAR SIGNALS
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THE ABILITY OF A RADAR TO RESOLVE OVERLAPPING SIGNALS.
AD-295 573 DIV. 8

*RADIATION COUNTERS
SOLID STATE PHYSICS

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AD-295 747 DIV. 20

*RADIATION DAMAGE
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EFFECTS OF FISSION-PRODUCT GAMMA RADIATION ON DIGITAL COMPUTER PRINTED CIRCUIT CARDS.
AD-295 695 DIV. 20

*RADIATION EFFECTS
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AD-295 807 DIV. 20

*RADIATION EFFECTS
COAXIAL CABLES

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AD-295 486 DIV. 20

*RADIATION EFFECTS
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AD-295 823 DIV. 16

*RADIATION EFFECTS
MAMMALS

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AD-295 864 DIV. 16

*RADIATION EFFECTS
PLASMA PHYSICS

THEORY OF RADIATION FROM SOURCES IN PLANE STRATIFIED ANISOTROPIC PLASMA MEDIA IS EXPLORED.
AD-295 075 DIV. 25

*RADIATION EFFECTS
ULTRAVIOLET RADIATION

A SOURCE AND DETECTOR OF RADIATION IN THE WAVELENGTH REGION OF 1500-50 ANGSTROMS SUITABLE FOR RADIATION EFFECTS STUDIES ON MATERIAL IN A VACUUM. ULTRAVIOLET RADIATION EFFECTS.
AD-295 895 DIV. 6

*RADIATION INJURIES
LABORATORY ANIMALS

ACTIVITIES OF A RESEARCH LABORATORY ON EFFECTS OF RADIATION ON LABORATORY ANIMALS.
AD-295 864 DIV. 16

*RADIATION INJURIES
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HALL EFFECT MEASUREMENTS IN INSULATORS; A 'TIME-OF-FLIGHT' METHOD OF STUDYING CARRIER TRANSPORT IN INSULATORS; A GENERAL ANALYSIS OF UNIPOLAR STEADY STATE SPACE CHARGE LIMITED CURRENTS IN INSULATORS; ORGANIC SEMICONDUCTORS; AND CDS ARE TOPICS INVESTIGATED IN PHOTOCONDUCTOR RESEARCH.
AD-295 659 DIV. 8

***SLEEP**
BEHAVIOR

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***SMALL ARMS**
CORROSION INHIBITION

STORAGE OF SMALL ARMS COMPONENTS UNDER VARIOUS CONDITIONS: OUTDOORS; SIMULATED TROPICAL CONDITIONS; TREATED WITH VARIOUS CORROSION INHIBITORS; PACKED IN POLYESTER FILM INNER WRAP.
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***SOILS**
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***SOLAR CELLS**
DESIGN

HIGH EFFICIENCY SI SOLAR CELLS. OBJECTIVE IS HIGH YIELDS - 70% OF THE CELLS HAVING EFFICIENCIES IN THE RANGE OF 12-14% LEADING TO A CELL COST OF $2-$3.
AD-295 056 DIV. 7

SOLAR CELL ARRAY OPTIMIZATION. RESEARCH AND FABRICATION PHASES OF THIS WORK WERE DIRECTED TOWARDS DEMONSTRATING THE POTENTIAL OF LARGE AREA, THIN-FILM CADMIUM SULFIDE PHOTOVOLTAIC MATERIALS. POWER-TO-WEIGHT RATIO FOR FOUR-INCH SQUARE CELLS APPROACHES 20 WATTS/LB.
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DEVELOPMENT AND EVALUATION OF SOLAR THERMIONIC POWER SYSTEM IN 1-10 KW RANGE SUITABLE FOR USE IN AEROSPACE VEHICLES; CONVERTERS OF VACUUM AND VAPOR TYPE.
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***SOLAR CELLS**
SPACESHIPS

SOLAR-ENERGY CONVERSION EMPLOYING CADMIUM SULFIDE. EVAPORATED CADMIUM SULFIDE FRONT WALL FILM CELL FOR APPLICATION IN A HIGH POWER-TO-WEIGHT RATIO, SOLAR ENERGY CONVERSION DEVICE.
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***SOLAR ENERGY**
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***SOLAR ENERGY**
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AD-295 950 DIV. 25

***SOLUBILITY**
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A SOURCE AND DETECTOR OF RADIATION IN THE WAVELENGTH REGION OF 1500-50 ANGSTROMS SUITABLE FOR RADIATION EFFECTS STUDIES ON MATERIAL IN A VACUUM, ULTRAVIOLET RADIATION EFFECTS.
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*SPACE FLIGHT
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*SPACE FLIGHT
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*SPACE MEDICINE
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AD-295 827 DIV. 16

*SPACE MEDICINE
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SPACE MEDICAL STUDIES PRELIMINARY TO THE FIRST USSR MANNED SPACE FLIGHT ARE BRIEFLY SURVEYED.
AD-295 780 DIV. 16

PHYSIOLOGICAL STRESSES ON MAN DURING SPACE FLIGHT AND RELATED SPACE MEDICAL RESEARCH CONDUCTED IN THE USSR ARE BRIEFLY DISCUSSED.
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*SPACESHIPS
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RADIATION HAZARDS TO MANNED SPACE FLIGHT ARE EVALUATED WITH RESPECT TO ELECTROMAGNETIC RADIATION FROM THE SUN, VAN ALLEN BELTS, SOLAR FLARE PROTONS, GALACTIC COSMIC PARTICLES DURING EARTH ORBITS, LUNAR AND INTERPLANETARY MISSIONS.
AD-295 127 DIV. 16

*SPACESHIPS
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*SPECIAL FUNCTIONS
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AD-295 048 DIV. 15

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AD-295 709 DIV. 15

*SPECIAL FUNCTIONS
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A ONE-DIMENSIONAL MODEL FOR THE BOLTZMANN EQUATION, BASED ON A FOKKER PLANCK-LIKE DIFFERENTIAL COLLISION OPERATOR IS PROPOSED IN ORDER TO STUDY THE VALIDITY OF THE USUAL APPROXIMATION METHODS AS WELL AS THE BEHAVIOR OF SOLUTIONS NEAR THE FREE MOLECULE LIMIT.
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*SPECIAL FUNCTIONS
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*SPECIAL FUNCTIONS
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*SPEECH
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*SPEECH TRANSMISSION
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*SPIN STABILIZED AMMUNITION
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EXPERIMENTS WITH THE LIQUID-FILLED, IMPULSIVELY STARTED, SPINNING CYLINDER.
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*STABILITY (LONGITUDINAL)
STRUCTURAL SHELLS

INVESTIGATION OF STABILITY IN A RIBBED CYLINDRICAL SHELL DURING LONGITUDINAL COMPRESSION.
AD-295 442 DIV. 25

*STAINLESS STEEL
CHEMICAL MILLING

ELECTROLYTIC ETCHING OF STAINLESS STEEL PLATES AND HONEYCOMB CORES: VARIOUS CHEMICAL COMPOUNDS USED FOR METAL SHAPING: PROCESSING OF AIRCRAFT MATERIALS.
AD-295 752 DIV. 26

*STAINLESS STEEL
ELECTRON MICROSCOPY

EXAMINATION OF METAL AND ALLOY FRACTURE SURFACES BY ELECTRON MICROSCOPIC FRACTOGRAPHY: FATIGUE, DUCTILE, INTERGRANULAR, TENSILE, SHEAR, AND CLEAVAGE FRACTURES.
AD-295 029 DIV. 25

*STAR TRACKERS
SOLID STATE PHYSICS

A STAR TRACKING SYSTEM CAPABLE OF TRACKING A SECOND MAGNITUDE STAR. UNIPOLAR TRANSISTOR IS USED AS THE ELECTRONIC CHOPPER AMPLIFIER.
AD-295 174 DIV. 8

*STATISTICAL ANALYSIS

AN ALGORITHM IS INVESTIGATED WHICH SYNTHESIZES A NETWORK OF THRESHOLD ELEMENTS DESIGNED TO PERFORM PATTERN RECOGNITION.
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*STATISTICAL ANALYSIS
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*STATISTICAL ANALYSIS
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*STATISTICAL DISTRIBUTIONS
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AD-295 009 DIV. 15

*STATISTICAL FUNCTIONS
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THE USE OF STATISTICAL METHODS IN DETERMINATION OF THE PARAMETERS OF LINEAR MICROWAVE JUNCTIONS: APPLICATION TO X-BAND ANTENNA FEED SYSTEMS OF MICROWAVE NETWORKS.
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*STATISTICAL PROCESSES
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QUEUING WHEN JOBS REQUIRE SEVERAL SERVICES WHICH NEED NOT BE SEQUENCED.
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*STEAM TURBINES
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TRANSLATION OF RUSSIAN REPORT ON MANUFACTURE OF STEAM TURBINES WITH STEAM PARAMETERS OF 300 ATM ABS AND 650 C USING AUSTENITIC STEELS, NI ALLOYS, AND PEARLITIC STEELS WITH COOLING.
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*STEEL
CORROSION INHIBITION

EVALUATION OF A PHOSPHATE ANODIZING TREATMENT FOR PREVENTING GALVANIC CORROSION BETWEEN MAGNESIUM AND STEEL.
AD-295 584 DIV. 17

*STEEL
CREEP

MECHANICAL PROPERTIES OF STEELS AT ROOM TEMPERATURE AND IN REGION OF PLASTIC DEFORMATION: CREEP CHARACTERISTICS OF METALS AND ALLOYS AT HIGH TEMPERATURES.
AD-295 069 DIV. 17

*STEEL
ELECTRON MICROSCOPY

EXAMINATION OF METAL AND ALLOY FRACTURE SURFACES BY ELECTRON MICROSCOPIC FRACTOGRAPHY: FATIGUE, DUCTILE, INTERGRANULAR, TENSILE, SHEAR, AND CLEAVAGE FRACTURES.
AD-295 029 DIV. 25

*STEEL
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IMPROVED TECHNIQUES FOR EXTRUSION AND DRAWING OF STEEL FOR ULTRA-THIN AIRFRAMES.
AD-294 983 DIV. 17

*STEEL
ROCKET CASES

INVESTIGATION OF STRESS-CORROSION CRACKING OF HIGH-STRENGTH ALLOYS. BENT-BEAM AND CENTER-NOTCHED SPECIMENS OF 6AL-4V TITANIUM SHOWED NO CRACKING. CHEMICAL AND MECHANICAL PROPERTIES OF 20%-NICKEL MARAGING AND 18%-NICKEL MARAGING STEEL AND 6AL-4V-TITANIUM.
AD-294 980 DIV. 17

*STEEL
VAPOR PLATING

VAPOR PLATING OF ALUMINUM ON LOW CARBON STEEL, COPPER, MAGNESIUM, TITANIUM, STAINLESS STEEL, GLASS, AND GRAPHITE.
AD-295 475 DIV. 17

*STORAGE
SMALL ARMS

STORAGE OF SMALL ARMS COMPONENTS UNDER VARIOUS CONDITIONS: OUTDOORS; SIMULATED TROPICAL CONDITIONS; TREATED WITH VARIOUS CORROSION INHIBITORS; PACKED IN POLYESTER FILM INNER WRAP.
AD-295 494 DIV. 22

*STRESS (PHYSIOLOGY)
MILITARY PERSONNEL

SURVEY OF THE EFFECTS OF LOAD CARRYING DEVICES AND EQUIPMENT DESIGN UPON TASKS PERFORMED BY THE COMBAT INFANTRYMAN.
AD-294 993 DIV. 29

*STRESS (PHYSIOLOGY)
SPACE FLIGHT

SPACE MEDICAL STUDIES PRELIMINARY TO THE FIRST USSR MANNED SPACE FLIGHT ARE BRIEFLY SURVEYED.
AD-295 780 DIV. 16

*STRESS (PSYCHOLOGY)
DIELECTRIC PROPERTIES

A METHOD IS PRESENTED FOR CALCULATING THE ECHO AREA OF A CONCENTRIC DIELECTRIC-CLAD SPHERE.
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*STRUCTURAL SHELLS
CYLINDRICAL BODIES

DETERMINATION OF MAXIMUM LOAD FOR RIBBED CYLINDRICAL SHELLS SUBJECTED TO SIMULTANEOUS AXIAL FORCES AND INTERNAL PRESSURE.
AD-295 812 DIV. 25

*STRUCTURAL SHELLS
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INVESTIGATION OF STABILITY IN A RIBBED CYLINDRICAL SHELL DURING LONGITUDINAL COMPRESSION.
AD-295 842 DIV. 25

*STRUCTURAL SHELLS
SYMPOSIA

TRANSLATION OF PROCEEDING OF RUSSIAN SYMPOSIUM ON STRENGTH OF THIN-WALLED CONSTRUCTION.
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*STRUCTURES
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DEVELOPMENT OF 2 DEVICES FOR MEASURING MECHANICAL IMPEDANCE IN HEAVY AND LIGHT STRUCTURES.
AD-295 836 DIV. 25

*SUBMINIATURE ELECTRICAL EQUIPMENT
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AD-295 185 DIV. 7

*SULFUR COMPOUNDS
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TRANSLATION OF RUSSIAN WORK ON INFLUENCE OF SULFUR-CONTAINING FUELS ON CONSTRUCTION MATERIALS OF GAS TURBINES.
AD-295 808 DIV. 10

*SUPERAERODYNAMICS

A ONE-DIMENSIONAL MODEL FOR THE BOLTZMANN EQUATION: BASED ON A FOKKER PLANCK-LIKE DIFFERENTIAL COLLISION OPERATOR IS PROPOSED IN ORDER TO STUDY THE VALIDITY OF THE USUAL APPROXIMATION METHODS AS WELL AS THE BEHAVIOR OF SOLUTIONS NEAR THE FREE MOLECULE LIMIT.
AD-295 066 DIV. 9

*SUPERSONIC FLIGHT
AERODYNAMIC HEATING

HEAT TRANSFER IN AERODYNAMIC HEATING; RADIATIVE AND ABSORPTIVE PROPERTIES OF BODIES; WALL TEMPERATURE DURING STEADY STATE THERMAL PROCESS; WALL HEATING DURING NONSTEADY STATE PROCESS.
AD-295 828 DIV. 9

*SUPERSONIC FLOW
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AN ANALYSIS OF NEARLY-FROZEN, NONEQUILIBRIUM SUPERSONIC EXPANSION OF A DISSOCIATED DIATOMIC GAS AROUND A SHARP TWO-DIMENSIONAL CORNER.
AD-295 981 DIV. 25

*SURFACES
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*SURFACES
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*SYNTHETIC RUBBER
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*SYNTHETIC RUBBER
PROSTHETICS

ADIPRENE L-100 URETHANE RUBBER WAS EVALUATED AS A COSMETIC GLOVE MATERIAL AND FOUND TO HAVE EXCELLENT FLEXIBILITY AND ELASTIC PROPERTIES. HOWEVER, IT SHOWED POOR STAIN RESISTANCE. PROCESSING DIFFICULTIES WERE ENCOUNTERED.
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*TARGET RECOGNITION
VISUAL ACUITY

INTERPRETATION PERFORMANCE AT HIGH RATES OF SPEED. PERFORMANCE MEASUREMENT AS A COMPLEX FUNCTION OF CONCISENESS, RELEVANCE, ACCURACY, AND RATE.
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*TELEMETER SYSTEMS
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SOLID STATE TELEMETRY RECEIVERS, MODULAR CONSTRUCTED, FOR USE AT SHORE FACILITIES AND AIRBORNE AND SHIPBORNE INSTALLATIONS.
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*TELEMETERING RECEIVERS
SOLID STATE PHYSICS

SOLID STATE TELEMETRY RECEIVERS, MODULAR CONSTRUCTED, FOR USE AT SHORE FACILITIES AND AIRBORNE AND SHIPBORNE INSTALLATIONS.
AD-295 011 DIV. 8

*TELEPHONE RECEIVERS
WALKIE-TALKIES

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*TELEPHONE TRANSMITTERS
WALKIE-TALKIES

DESIGN, DEVELOPMENT AND TESTING OF A MINIATURE HANDSET FOR USE WITH MAN-PACK RADIO EQUIPMENT.
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*TELESCOPES
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*TEMPERATURE CONTROL
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*TEMPERATURE CONTROL
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SOLIDIFICATION TECHNIQUES AND TEMPERATURE AND PRESSURE CONTROL SYSTEMS FOR METHENE GASES.
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*TERRAIN
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*TERRESTRIAL MAGNETISM
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AD-294 968 DIV. 2

*TERRESTRIAL MAGNETISM
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INTERACTION BETWEEN THE GEOMAGNETIC FIELD AND SOLAR CORPUSCULAR RADIATION.
AD-294 947 DIV. 2

*TEST EQUIPMENT
CABLE ASSEMBLIES

OPERATION AND EVALUATION OF PORTABLE SYSTEM FOR MEASURING TENSION AND PAYOUT ON STATIONARY OR MOVING SHIPS CABLE.
AD-294 928 DIV. 31

*TEST EQUIPMENT
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EVALUATION OF SOLE LEATHER UNDER A VARIETY OF WEAR CONDITIONS.
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*TEST EQUIPMENT
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EXPERIMENTS WITH THE LIQUID-FILLED, IMPULSIVELY STARTED, SPINNING CYLINDER.
AD-295 177 DIV. 9

*TEST METHODS
CABLE REELS

OPERATION AND EVALUATION OF PORTABLE SYSTEM FOR MEASURING TENSION AND PAYOUT ON STATIONARY OR MOVING SHIPS CABLE.
AD-294 928 DIV. 31

*TEST METHODS
LEATHER

EVALUATION OF SOLE LEATHER UNDER A VARIETY OF WEAR CONDITIONS.
AD-295 675 DIV. 14

*TESTS
JOB ANALYSIS

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AD-295 001 DIV. 23

*TETRODES
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PRODUCTION ENGINEERING EFFORT TO PRODUCE CERAMIC TETRODES: 40 WATTS: 3000 MC.
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*THEODOLITES
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AD-295 749 DIV. 15

*THERMAL CONDUCTIVITY
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*THERMAL CONDUCTIVITY
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AD-295 453 DIV. 25

*THERMAL DIFFUSION
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THERMAL DIFFUSIVITY OF SOLID MATERIALS FROM -180 TO 200 C.
AD-295 887 DIV. 9

*THERMAL RADIATION
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*THERMAL RADIATION
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*THERMIONIC EMISSION
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*TRIODES
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*TUNGSTEN ALLOYS
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*TURBULENT FLOW
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*TURBULENT FLOW
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*ULTRAVIOLET RADIATION
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*UNDERWATER RADIO TRANSMISSION
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*URETHANES
ELASTOMERS

LOW TEMPERATURE OIL RESISTANT URETHANE ELASTOMER SYNTHESIS. ELASTOMER FORMULATIONS WERE BASED ON 2 POLYETHER TRIOLS. AMINE TO HYDROXYL RATIOS WERE VARIED AND EFFECTS ON TORSIONAL MODULUS MEASURED.
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***WINGS**
PNEUMATIC DEVICES

ANNOTATED BIBLIOGRAPHY ON PARAWING GLIDERS.
AD-295 143 DIV. 1

***WOUNDS**
CONTAMINATION

A SOLID STATE POCKET RADIATION DETECTION SYSTEM.
AD-295 747 DIV. 20

***WOUNDS**
RADIATION EFFECTS

A SOLID STATE POCKET RADIATION DETECTION SYSTEM.
AD-295 747 DIV. 20

***X RAYS**
BIBLIOGRAPHY

BIBLIOGRAPHY OF SOVIET LITERATURE ON X-RAY AND OPTICAL SPECTRA.
AD-295 868 DIV. 25

***XENON**
CHEMICAL BONDS

XE F COMPOUND BONDING. THEORETICAL DISCUSSION OF THE POSSIBILITY OF FORMATION OF RARE GAS FLUORIDES. ACCORDING TO THIS THEORY XE AND KR SHOULD BOTH FORM RARE GAS FLUORIDES.
AD-295 125 DIV. 4

***ZIRCONIUM ALLOYS**
INTERMETALLIC COMPOUNDS

CHARACTERISTICS OF INTERMETALLIC COMPOUNDS AS THERMIONIC EMITTERS. EVAPORATION DATA WERE OBTAINED FOR METALLIC BERYLLIUM, ZIRCONIUM BERYLLIDES AND NIOBIUM BERYLLIDES.
AD-295 109 DIV. 17

TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-294 902 Div. 1, 9
(TISTA/GEC) OTS price $15.00

Maryland U., College Park.
EXPERIMENTAL STUDIES OF THE AERODYNAMICS OF GROUND EFFECT MACHINES.
Rept. for July 61-June 62.
Nov 62, 212p. incl. illus. tables.
(Contract DA 44-177-tc-776, Proj. 9R99-01-005-02)
(TCREC TR 62-88) Unclassified report

DESCRIPTORS: *Flying platforms, Aerodynamics, Stability, Model tests, Gas flow, Pressure, Aerodynamic configurations, Control systems, Yaw, Pitch, Ground effect.

The results are presented of a series of experiments conducted to investigate the basic aerodynamics of ground effect machines. Two-dimensional model tests and full scale tests of the Tinajero ground effect machine were made. The flow patterns and pressure distributions around a vehicle at various flight conditions were investigated and the effects of nose shape on these patterns was determined. It was found that nose shape had no significant effect on the cushion under the vehicle, but does have an effect on the basic external aerodynamic coefficients. Sketches of typical flow patterns, typical pressure distribution, and aerodynamic coefficients around critical points are presented. Pressure distributions under the vehicle, static stability curves, dynamic damping coefficients, and some aerodynamic coefficients are presented. The machine was found to be basically unstable in yaw and the controls were ineffective. The directional stability problem prohibited a complete investigation at forward speeds. (Author)

AD-295 054 Div. 1
(TISTA/FRL) OTS price $1.10

Engineering Development Lab., Naval Air Development Center, Johnsville, Pa.
COMPONENT RELIABILITY TEST OF AUTOMATIC LANDING SYSTEM RELAY BOX,
by George M. Nelson, Jr. 20 Sep 62, 5p. incl. illus. (Rept. no. NADC-ED-L6280)
(WEPTASK no. RM-42-1-001/202-1/F017-06-05)
Unclassified report

DESCRIPTORS: *Relays, *Electric relays, Reliability, Electric insulation, Tests, Resistance, Vibration, Instrument landings.

The component reliability test of the automatic landing system relay box is described. The following checks and tests were performed on each unit as follows: visual inspection, insulation check, resistance, continuity, bench operation and vibration. (Author)

AD-295 088 Div. 1, 9
(TISTA/FRL) OTS price $10.50

Bell Helicopter Co., Fort Worth, Tex.
INVESTIGATION OF CONTROLLED FLOW PHENOMENA FOR AIR CUSHION VEHICLES.
Nov 62, 128p. incl. illus. tables (Rept. no. 532-099-001)
(Contract DA 44-177-tc-744, Proj. 9R99-01-005-05)
(TCREC TR 62-46) Unclassified report

DESCRIPTORS: *Flying platforms, Gas flow, Aerodynamic configurations, Stability, Control systems, Model tests, Jets, Pitch, Lift, Pressure, Velocity, Integral equations, Theory, Design, Ground effect.

Findings are presented of an investigation of controlled flow phenomena for air cushion vehicles. Objectives were: achieving efficient, practical approximations to ideal controlled flow, evaluating the merits of controlled flow configurations in the hovering flight regime by comparing their performance and stability with conventional plenum and peripheral jet designs, and determining the characteristics of integrated stabilization, propulsion, and control systems in a controlled flow configuration. The theoretical expressions of ideal hovering performance for single and concentric peripheral jet configurations are derived and presented. Hovering performance results are presented for the several versions of the circular, square, single fan oval and tandem fan oval models, in that order, and concludes with two versions of the external flow model. (Author)

AD-295 089 Div. 1, 9
(TISTA/GEC) OTS price $7.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
A METHOD FOR COMPUTING ROTARY WING AIRLOAD DISTRIBUTION IN FORWARD FLIGHT.
Rept. for Sep 60-Apr 62,
by Raymond A. Piziali and Frank A. DuWaldt.
Nov 62, 66p. incl. illus. tables, 38 refs. (CAL rept. no. BB-1495-S-1)
(Contract DA 44-177-tc-698, Proj. 9R38-01-019-04)
(TCREC TR 62-44) Unclassified report

DESCRIPTORS: *Helicopter rotors, *Helicopter blades, Flight testing, Pressure, Harmonic analysis, Wake, Numerical analysis, Mathematical prediction, Aerodynamics, Load distribution.

An investigation was made to obtain a solution to the airloads problem for a rotating wing in steady-state translational flight. A sufficient amount of the wake detail was retained to enable accurate computation of the wake-induced velocities at the blade. The method of solution developed is numerical, utilizes high-speed digital computation, and is relatively simple to use. Each blade was represented by a segmented lifting line and the shed and trailing vorticity distributions are represented by a continuous mesh of segmented vortex filaments originating at the instantaneous position of the blade. The wake of each blade of the rotor was different; these wakes change with the azimuth position of the blades to correspond to the instantaneous wake configuration for each azimuth position. The method developed was used to compute the rotor airload distributions for the Bell HU-1A, the Sikorsky H-34, and an NASA model

rotor in forward flight. The computed airloads were harmonically analyzed and the radial distribution of each harmonic compared with the measured distributions. In general, encouraging agreement is obtained in these comparisons. Effects of changing some of the parameters of the computation were investigated. (Author)

AD-295 090 Div. 1
(TISTA/GEC) OTS price $9.10

Bell Helicopter Corp., Fort Worth, Tex.
A STUDY OF THE ORIGIN AND MEANS OF REDUCING HELICOPTER NOISE,
by C. R. Cox and R. R. Lynn. Nov 62, 102p. incl. illus. tables, 20 refs. (Rept. no. 299-099-180)
(Contract DA 44-177-tc-729, Proj. 9R38-01-022-01)
(TCREC TR 62-73) Unclassified report

DESCRIPTORS: *Airplane noise, *Airplane engine noise, Helicopter blades, Helicopter rotors, Acoustics, Reduction, Pressure, Sound, Measurement, Helicopters, Helicopter engines.

Results are presented of an experimental and analytical study of the origin and possible means of reducing helicopter noise. Acoustical and performance data are presented for a single rotor turbine powered helicopter (HU-1A) with several main rotor configurations. Also, simultaneously recorded rotor blade pressure and acoustical test data are given. Noise criteria are reviewed and established on the basis of over-all sound pressure and loudness level. The latter pertains to the auditory sensation as perceived by an observer and is preferable as a measure of the relative importance of the various noise sources. Based on the loudness level criterion, the most prominent noise components of the test helicopter are identified. For the far field case these are, in their order of prominence: main rotor blade slap (when it occurs), tail rotor rotational noise, main rotor vortex and rotational noise, and drive system and power plant noise. Blade slap is characterized by high intensity sound pressures of all frequencies and occurs at the blade passage frequency. This noise is shown to be dependent upon flight condition and configuration. It is noted that single rotor helicopters are less susceptible to blade slap than tandem machines. (Author)

AD-295 108 Div. 1
(TISTA/FRL) OTS price $9.10

Eclipse-Pioneer Div., Bendix Corp., Teterboro, N. J.
ANALYTICAL STUDY OF ILS BEAM CHARACTERISTICS,
by J. Doniger. 31 Aug 62, 90p. incl. illus. tables, 11 refs.
(Contract ARDS-451, Proj. 114-1312D)
Unclassified report

DESCRIPTORS: *Jet plane noise, *Jet engine noise, *Noise analyzers, Analysis, Automatic pilots, Radio beams, Waveguide couplers, Terrain, Reflection, Instrument landings, Glide path systems, Analog computers.

Results are presented of analog computer studies and analyses of the noise component in the ILS glide path and localizer course structures due to terrain reflections. Actual recordings of the noise at the 25 ILS sites which will probably be used in the initial lower minimum operations below 200 feet were furnished to the contractor by the FAA. The studies included the comparison of various possible ILS course/path noise figures of merit as they related to the performance of presently accepted airborne coupler and autopilot systems with the KC-135, DC-7, and TF-102 aircraft. An attempt was made to characterize the measured ILS course/path noise in terms of power spectral density as well as amplitude and to use such a characterization to accept or reject installations. Only weak correlations were found to exist between aircraft performance and the possible power spectral figures of merit. A satisfactory course/path noise amplitude specification of 5 micro a in the localizer and 20 micro a in the glide path at low altitudes can be specified with the increased probability of rejection of some ILS facilities for approaches below the present 200 feet minimum. (Author)

AD-295 138 Div. 1
(TISTA/FRL) OTS price $1.25

Gayston Corp., Dayton, Ohio.
OPTIMUM NUMBER AND TYPE OF STATIC DISCHARGERS FOR T-33 AND F-100 JET AIRCRAFT,
by P. H. Stone, Jr. and R. H. Kuhbander. Sep 62, 42p. incl. illus. tables, 2 refs.
(Contract AF 33(657)8440, Proj. 4357)
(ASD TDR 62-814) Unclassified report

DESCRIPTORS: *Military aircraft, Jet fighters, Jet training planes, Flight testing, Static eliminators, Static dischargers, Lightning arrestors.

The purpose of the work undertaken was to determine the effectiveness of the diverter discharger with regard to static dissipation and lightning protection. It was a further purpose of this work to determine the optimum number of dischargers for the specific aircraft being used. Eight different configurations were planned for the F-100 aircraft and the T-33 aircraft. These plans were then executed on various flights. Use of the static dischargers resulted in considerable improvement in communications and the dischargers diverted lightning from the aircraft proper on many of the flights. The improvement in static level was particularly significant since the level of intensity of the storms was at a new high for aircraft penetration. (Author)

AD-295 143 Div. 1
(TISTA/FRL) OTS price $1.10

Martin Marietta Corp., Denver, Colo.
AN ANNOTATED BIBLIOGRAPHY ON PARAGLIDERS,
by Clyde Briggs. Jan 63, 4p. 19 refs. (Literature search no. 24)
Unclassified report

DESCRIPTORS: *Gliders, *Wings, *Bibliography, Recovery, Pneumatic devices.

AD-295 169 Div. 1, 23
(TISTA/FRL) OTS price $2.60

Bell Helicopter Co., Fort Worth, Tex.
SIMULATION EVALUATION OF A HEAD MOUNTED ORIENTATION DISPLAY.
Technical data on Army-Navy Instrumentation Program,
by W. E. Feddersen. May 62, 24p. incl. illus. 8 refs. (Rept. no. D228-421-012)
(Contract Nonr-167000)
Unclassified report

DESCRIPTORS: *Helmets, *Helicopters, *Flight instruments, Visual signals, Flight testing, Tests, Flight simulators, Altimeters, Pitch, Roll, Human engineering, Maneuverability, Sensory perception, Display systems, Analog systems.

Results of a study designed to determine the effect upon hovering performance of angular differences between head position and field of view as presented by a helmet-mounted contact analog display are presented. The results, as presented in terms of integrated absolute ground position error scores, indicated that pre-test performance on a panel-mounted contact analog display was superior to that exhibited by the subjects on the helmet-mounted display. Such was to be expected since the former system was near optimum in terms of resolution, clarity, comfort and subject experience. When performing with the helmet-mounted display the Ss' performance deteriorated but the deterioration was distributed across all conditions of head position and field of view and was not restricted to any particular head orientation. As determined by a standard non-parametric test of significance none of the performance differences between left and right hand position were significant when compared with the condition in which the forward looking display view coincided with the orientation of the head. (Author)

AD-295 400 Div. 1, 9
(TISTA/VGW) OTS price $1.60

David Taylor Model Basin, Washington, D. C.
PHASE II TETHERED TESTS AND LOW-SPEED FREE FLIGHT TESTS OF GEM III,
by Arthur E. Johnson. Dec 62, 17p. incl. illus. 3 refs. (AERO rept. no. 1049; Rept. no. 1700)
Unclassified report

DESCRIPTORS: *Flying platforms, *Marine Corps, Flight testing, Control systems, Ducted fans, Aviation safety, Pilot seats, Aerodynamics, Effectiveness, Ground effect, Military aircraft.

Second-phase tests of the Marine Corps GEM III vehicle were made in order to evaluate the effectiveness of a modified control system and to determine handling characteristics in free flight. Results of tethered tests showed that effectiveness of the modified controls was adequate for untethered flights. Untethered tests then showed that maximum velocity was 27.4 fps, that the maximum slope which GEM III could climb (or above which it could hover) was a 9% grade, and that lateral acceleration in turns with full thrust was about the same as for hovering above a slope, but varied slightly with turn radius. Following free flight tests, a reversible pitch shrouded propeller-engine unit was installed on the vehicle to increase propulsive and breaking thrust for additional tests at Langley Research Center. (Author)

AD-295 477 Div. 1
(TISTA/GEC) OTS price $8.10

Denver Research Inst., Colo.
BALLOON FLIGHTS OF APRIL 9 AND MAY 23, 1962,
by David G. Murcray, James N. Brooks and others
27 Dec 62, 84p. incl. illus. (Flight data rept. no. 5)
(Contract AF 33(616)7633)
Unclassified report

DESCRIPTORS: *Balloons, Radiometers, Infrared detectors, Instrumentation, Indium alloys, Antimony alloys, Programming, Automatic, Infrared radiation, Liquefied gases, Oxygen, Scientific research.

Results obtained on balloon flights made with an automatic programmed radiometer system are presented. The radiometer was equipped with a liquid-oxygen-cooled In Sb cell as a detector, and measurements were made of the infrared background radiation from 1.8 to 5.0 microns. (Author)

AD-295 701 Div. 1, 12, 25
(TISTM/EJH) OTS price $5.60

Polytechnic Inst. of Brooklyn, N. Y.
STRESSES IN ECCENTRIC STEPWISE DISCONTINUOUS REINFORCING RINGS WITH TRANSITION SECTION,
by Arnold Allentuch and Joseph Kempner. Dec 62, 44p. incl. illus. 5 refs. (PIBAL rept. no. 651)
(Contract Nonr-83914, Proj. NR 064-167)
Unclassified report

DESCRIPTORS: *Rings, *Stresses, Loading, Structural shells, Cylindrical bodies, Deformation, Configuration, Mathematical analysis.

The stress distribution in a ring of non-uniform cross section under the action of a uniform radial line load is obtained. The ring is fabricated in three segments; the cross-sectional area of one segment varies according to a power function and connects two uniform segments. Several sets of parameters are chosen for numerical calculations. Within these sets only the length of the transition section changes. Thus, an appraisal of the importance of the transition section in reducing the maximum stress is made. The stress distribution for each length of the transition section chosen is plotted. The maximum bending stresses are reduced by as much as 63% because of the transition section. The corresponding length of the transition section is approximately 60 degrees. (Author)

AD-295 940 Div. 1, 2
(TISTA/GEC) OTS price $1.60

Winzen Research, Inc., Minneapolis, Minn.
PROJECT SKY HOOK.
Rept. for 1 Jan-31 Dec 62,
by Robert M. Enderson. 5 Feb 63, 10p. incl. illus. (Rept. no. 1273-R)
(Contract Nonr-146010)
Unclassified report

DESCRIPTORS: *Balloons, *Meteorological balloons, Flight testing, Flight paths, Scientific research, Magnetometers, Cloud chambers, Instrumentation, Moisture meters, High altitude, Design.

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-294 943 Div. 2
(TISTW/PCR) OTS price $9.10

General Mills, Inc., Minneapolis, Minn.
THE STRATOSPHERIC MONSOON. PART I. AN ATLAS OF PREVAILING MONTHLY ZONAL WINDS IN THE STRATOSPHERE OVER THE NORTHERN HEMISPHERE,
by A. D. Belmont. 3 Aug 62, 1v. incl. illus. 4 refs. (Technical rept. no. 1; Rept. no. 2316)
(Contract Nonr-158920)
Unclassified report

DESCRIPTORS: *Wind, Meteorological charts, Meteorological data, Meteorology, Climatic factors, Velocity, Pressure, Frequency, Stratosphere, Northern hemisphere, Maps.

The seasonal reversal of stratospheric winds is one of the major features of the general circulation. Previous studies have described the 'normal' progress of this reversal along the east and west coasts of North America and the individual yearly events of 1957, 1958, and 1959. Some interesting and irregular features of this process led us to see how it occurs on a larger scale, and with respect to longitude.

Stratospheric circulation is usually too asymmetric to allow generalization from a single meridian. We thus present here the same parameters used earlier, on a hemispheric scale at four levels (100, 50, 30, and 10 mb), to demonstrate how the reversal is propagated by month with respect to longitude, latitude, and altitude. This text is intended mainly to explain how the atlas was prepared, and to give a preliminary description of the main features of the monsoon. A full discussion of the reversal process and a comparison with earlier results is under preparation as a separate paper. (Author)

AD-294 947 Div. 2
(TISTP/FR) OTS price $7.60

Microwave Lab., Stanford U., Calif.
REVIEW OF THE INTERACTION BETWEEN THE GEOMAGNETIC FIELD AND THE SOLAR CORPUSCULAR RADIATION.
Technical note on Electrodynamic Problems of Astrophysics,
by R. Blum. Nov 62, 70p. incl. illus. refs.
(ML rept. no. 975)
(Contract AF 49(638)342) Unclassified report

DESCRIPTORS: *Solar energy, *Terrestrial magnetism, Magnetic storms, Aurorae, Electric currents, Protons.

Contents:
Experimental evidence
The solar corona
The solar corpuscular radiation
The heliomagnetic field
The GMF-SCR interaction
Geomagnetic storms
Ring currents
The aurora and air glow
Solar corpuscular radiation
Kinetic properties of the SCR
Parker's model
Chamberlain's model
Geomagnetic storms
First phase
Early work
The cylindrical model
The plane model
Main phase of storm
Ring currents
Aurorae
Steady-state GMF-SCR interaction
One-dimensional model
Two-dimensional model
Three-dimensional model
Analogies from gasdynamics
Stability

AD-294 968 Div. 2, 8
(TISTW/PCR) OTS price $1.60

Anti-Submarine Warfare Lab., Naval Air Development Center, Johnsville, Pa.
GEOMAGNETIC FLUCTUATION STUDIES AT THE U. S. NAVAL AIR DEVELOPMENT CENTER,
by D. P. Miles and R. P. Lepping. 28 Dec 62, 8p. incl. illus. (Rept. no. NADC-AW-6240)
(WEPTASK no. R360FR102/2021/R011-01-01) Unclassified report

DESCRIPTORS: *Terrestrial magnetism, *Magnetometers, Protons, Rubidium, Vapors, Reliability, Magnetic storms, Noise, Nuclear explosions, Instrumentation, Measurement.

A proton precession station magnetometer and a rubidium vapor station magnetometer have been in operation at the U. S. Naval Air Development Center for considerable periods since July 1961. Experience obtained concerning the operational reliability of these magnetometers when operated for sustained periods is discussed briefly. Examples are shown of rubidium vapor magnetometer recordings of a sudden commencement storm, a magnetic bay, micropulsations during a storm, and a micropulsation storm. Charts from the rubidium vapor magnetometer and an AN/ASQ-10 magnetic anomaly detector (MAD) system operating simultaneously on several occasions are shown. A separate channel containing a filter to duplicate the AN/ASQ-10 passband has been added to the rubidium vapor magnetometer, and several records of geomagnetic noise in this passband as recorded by this instrument are shown. (Author)

AD-294 970 Div. 2, 30
(TISTW/PCR) OTS price $3.60

Texas A. and M. Coll., College Station.
VERTICAL MOTION CALCULATIONS AND SATELLITE CLOUD OBSERVATIONS OVER THE WESTERN AND CENTRAL UNITED STATES,
by John Hansen and Aylmer H. Thompson. 2 Jan 63, 31p. incl. illus. tables, refs. (Scientific rept. no. 2; Ref. no. 62-23-T)
(Contract AF 19(604)8450, Proj. 6698)
(AFCRL 62-1094) Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Air mass analysis, *Clouds, *Upper atmosphere, Meteorology, Kinetic theory, Adiabatic gas flow, Mathematical analysis, Velocity, Computers, Tables, Vertical indicators, Motion, Satellite vehicle research.

Vertical motions over the western and central United States during a three day period in August, 1961, were computed by several methods. The resulting analyses, applicable at 700 mb or 10,000 ft were compared both subjectively and objectively to each other and to approximately synoptic TIROS nephanalyses. The results of the comparisons showed only moderate agreement among the various methods and between the vertical motion analyses and the TIROS information. The kinematic method, based on observed winds, appeared to give the best agreement with the satellite picture indications of vertical motion, though it seemed little better than some of the other methods. The use of satellite data shows definite promise as a means of evaluating computed vertical motion fields and should eventually contribute to the improvement of the procedures used to compute vertical motions. A lag, or trailing effect, was noted in the relation between the vertical motion patterns and the cloud distribution. (Author)

AD-294 971 Div. 2, 8
(TISTW/PCR) OTS price $3.60

Space Sciences Lab., U. of Calif., Berkeley.
THE RECORDING OF EARTH CURRENTS,
by Stanley H. Ward and John L. Douglass. Oct 62, 20p. illus. refs. (Series no. 3, Issue no. 28)
(Contract Nonr-22289) Unclassified report

DESCRIPTORS: *Earth, *Electric currents, Design, Electrodes, Stability, Resistance, Impedance, Insulating materials, Sensitivity, Photographs, Recording systems.

Contents:
Considerations in design of an earth current system
Electrode stability
Electrode contact resistance and recorder input impedance

Placement and insulation of connecting leads
Elimination of extraneous signals and selection of recording bandwidth
Recorder sensitivity and range
Timing
Recording medium and techniques of data analysis
Description of system
Typical signals recorded

AD-295 079 Div. 2
(TISTP/JW) OTS price $2.60

Woods Hole Oceanographic Institution, Mass.
DEEP SUBMERGENCE RESEARCH.
Annual summary rept. no. 1, 1 Nov 61-31 Oct 62. Nov 62, 12p. illus. (Ref. no. 62-41)
(Contract Nonr-348400)
Unclassified report

DESCRIPTORS: *Oceanography, *Underwater equipment, Instrumentation, Research test vehicles, Hydrology, Underwater, Design.

AD-295 407 Div. 2, 30
(TISTP/JEA) OTS price $6.60

Naval Ordnance Test Station, China Lake, Calif.
SURFACE WIND PATTERNS AT THE NAVAL ORDNANCE TEST STATION,
by D. L. Farnham and R. C. Gould. Dec 62, 62p. incl. illus. tables, 9 refs. (NOTS TP 3060)
(NAVWEPS rept. no. 8057)
Unclassified report

DESCRIPTORS: *Wind, *Weather forecasting, Climatic factors, Stability, Convection, Temperature, Meteorological charts, Vertical gust recorders, Wind direction indicators, Barometers, Anemometers, Gusts, Barometric pressure, Upper atmosphere, Measurement, Surface area, Data.

Continuous surface wind data, recorded around the clock for a year at seven U. S. NOTS test range locations, are analyzed and evaluated. Surface and upper-air charts showing graphical results of the evaluation are included. Prevailing seasonal wind patterns and their appropriate indices have been determined for those seasons in which definite patterns emerged. (Author)

AD-295 436 Div. 2
(TISTA/VGW) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NEWS OF THE COMMISSION ON PLANETARY PHYSICS (SELECTED ARTICLES).
13 Dec 62, 18p. incl. illus. table, refs. (Trans. no. FTD-TT-62-1514 from Russian Periodical, Izvestiya Komissii Po Fizike Planet, No. 2, pp. 46-54 and pp. 65-72, 1960)
Unclassified report

DESCRIPTORS: *Moon, Astronomical data, Thermal radiation, Albedo (Astronomy), Mathematical analysis, Surface temperatures, Reflections.

Preliminary results are given of measuring the temperature of individual sections of the lunar surface. Observations were carried out with the aid of a vacuum thermoelement at the Abastumansk Observatory. Analysis was made by the Menzel method, somewhat modified by the author. The amount of water vapor determining the absorption of planetary heat in the atmosphere was calculated in accordance with Hann formula governing absolute humidity at the surface of the Earth. Indicatrices are computed reflection of individual sections of the lunar surface situated not only near the intensity equator, but also over the entire lunar disk. These data should allow for a more definite comparison of reflective properties and the microstructure of details of various morphological types situated in various sections of the lunar disk. (Author)

AD-295 455 Div. 2
(TISTP/JEA) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SYNTHESIS OF THE FORMS OF ATMOSPHERICS,
by D. S. Fligel'. 4 Jan 63, 31p. incl. illus. tables, 12 refs. (Trans. no. FTD-TT-62-1193 from Akademiya Nauk SSSR, Trudy Nauchno-Issledovatel'skogo Instituta Zemnogo Magnetizma, Ionosfery, i Rasprostraneniya Radiovoln, no. 17(27) pp. 27-49, 1960)
Unclassified report

DESCRIPTORS: *Atmospherics, *Electromagnetic waves, Ionosphere, Experimental data, Radiation effects, Range, Radio waves, Low frequency, Fourier analysis, Wave transmission, Atmospheric electricity, Lightning, Radiofrequency spectrum analyzers, Bessel functions, Propagation, Detection, Phase studies.

Atmospherics formed from lightning discharges are a convenient object for investigating long and super-long electromagnetic waves. In previous works it was shown that the phase velocity of the electromagnetic waves comprising atmospherics and the effective conductivity of the lower ionosphere can be determined by analyzing the phase (and to some extent the amplitude) characteristics of single atmospherics. A reasonably correct solution of the opposite problem was also of great interest, viz., to calculate theoretically, on the basis of a specific model of the ionosphere evolving from experimental data and on the basis of experiments on the spectral properties of the source, the forms of atmospherics expected at various distances. Comparison of the signals thus calculated with the atmospherics observed experimentally would make it possible to verify the correctness of the general theoretical assumptions used for this and to explain whether the effective parameters obtained theoretically for the selected ionosphere model were observed during the experiment. (Author)

AD-295 457 Div. 2
(TISTA/VGW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PLANET OF ENIGMAS,
by L. Maksimov. 11 Dec 62, 17p. (Trans. no. FTD-TT-62-1775 from Komsomolskaya Pravda, 2 Nov 1962)
Unclassified report

DESCRIPTORS: *Mars, Translations, USSR, Astronomical data, Surface properties.

AD-295 473 Div. 2
(TISTW/JEA) OTS price $7.60

Army Engineer Waterways Experiment Station, Vicksburg, Miss.
A TECHNIQUE FOR MAPPING TERRAIN MICROGEOMETRY,
by R. T. Saucier and J. D. Broughton. Nov 62, 74p. incl. illus. (Technical rept. no. 3-612)
Unclassified report

DESCRIPTORS: *Mapping, *Terrain, *Soils, Geometry, Climatic factors, Measurement, Statistical data, Water supplies, Water, Statistical distributions, Maps, Army, Surface areas, Surface properties, Surface temperatures, Tables, Technological intelligence, Moisture.

Division 2 - ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-295 599 Div. 2, 12
(TISTP/JW) OTS price $3.60

White Sands Missile Range, N. Mex.
WIND VARIABILITY AND ITS EFFECT ON ROCKET IMPACT PREDICTION,
by Manuel Armendariz, Frank Hansen and Patsy S. Carnes. Jan 63, 30p. incl. illus. tables, 7 refs. (Technical rept. no. SELWS-M-21)
(DA Proj. 3A99-27-005-10)
Unclassified report

DESCRIPTORS: *Wind, *Rockets, Probability, Velocity, Computer logic, Theodolites, Instrumentation, Atmospherics, Impact shock.

The variability of wind from 200 to 2000 feet above the surface at White Sands Missile Range was studied. Wind variability as a function of time (3.5, 4.0, 8.0, 10.0, and 11.5 minutes) is presented. Data for the study were obtained from double-theodolite pilot-balloon observations. The absolute mean and the standard deviation of the difference in wind velocity for 100-foot intervals from 200 to 2000 feet indicate the magnitude of the change that can be expected in a given time increment for a given height level. The effect of this variability on the computed impact point of an Aerobee rocket is discussed. (Author)

AD-295 600 Div. 2, 12
(TISTW/PCR) OTS price $1.60

Harvard Coll. Observatory, Cambridge, Mass.
EFFECTIVE AREA OF SATELLITE-BORNE ANTENNAS FOR RADIO ASTRONOMY,
by Sheldon S. Sandler. Aug 62, 12p. incl. illus. 9 refs. (Scientific rept. no. 1)
(Contract AF 19(604)6120, Proj. 8605)
(AFCRL 62-1056) Unclassified report

DESCRIPTORS: *Satellite vehicle antennas, *Radio astronomy, Polarization, Mathematical analysis, Equations, Blackbody radiation, Temperature, Measurement, Bibliography, Effectiveness.

The use of satellite antennas for precision measurements of polarized or unpolarized radiation in space requires a consistent quantitative antenna theory. For most practical antenna applications, only a rough qualitative knowledge is required. However, when the radio astronomer is concerned with interpreting the numerical values of antenna measurements, a thorough understanding of the operation of the antenna is required. Some elementary problems in the use of satellite antennas are presented. These problems are covered under the general topic of determining the effective area of a receiving antenna. In more elementary terms, the radiation impinging on the antenna must be related to measurements at the antenna terminals. For example, the relation between the power density in a randomly polarized field near the antenna and the power dissipated in a load resistor connected to the antenna terminals must be established. (Author)

AD-295 677 Div. 2, 30
(TISTP/WH) OTS price $2.60

Army Electronics Research and Development Lab., Fort Monmouth, N. J.
DOUBLE THEODOLITE-ANEMOMETER WIND-MEASURING SET,
by Donald E. Johnson. Aug 62, 27p. incl. tables, 1 ref. (AELRDL Technical rept. no. 2287)
Unclassified report

DESCRIPTORS: *Wind, *Anemometers, *Theodolites, *Guided missile trajectories, Measurement, Instrumentation, Meteorology.

This report discusses the feasibility of combining a double theodolite wind-measurement with an anemometer wind-measurement, with the intent of having the combination form a practical wind-measuring system. The wind data from such a combination would be applied to the correction of a rocket-launcher setting before firing a free missile. A theoretical discussion and supporting data are presented to show that this combination of equipment is not feasible for the formation of a practical system. (Author)

AD-295 694 Div. 2
(TISTP/FR) OTS price $3.60

Harvard Coll. Observatory, Cambridge, Mass.
THEORY OF THE Z-MODE PROPAGATION,
by M. D. Papagiannis. Aug 62, 33p. incl. illus. 19 refs. (Scientific rept. no. 2)
(Contract AF 19(604)6120, Proj. 8605)
(AFCRL 62-1057) Unclassified report

DESCRIPTORS: *Radio waves, *Ionospheric propagation, Ionosphere, Magnetic fields, Refraction, Equations.

The basic equations for propagation of electromagnetic waves in a magnetoionic medium are given from which it was deduced that a third wave, called the Z-mode, can propagate under certain conditions beyond the height at which $f^2 = \frac{Ne^2}{\pi m}$. At vertical incidence, the Z-mode will be produced either when the magnetic field is almost vertical (high geomagnetic latitudes) or when the collision frequency ν approaches the critical collision frequency ν_c, i.e., when $\nu \approx \nu_c = 2\pi f_H \frac{\sin^2\alpha}{2\cos\alpha}$. This condition is met only in the lower ionospheric regions at high geomagnetic latitudes, so that ν_c is not too large. At mid-latitudes this coupling process is extremely weak and cannot account for the phenomenon of the Z-mode. The oblique incidence approach must, therefore, be adopted. For this case, it was seen that when $\sin\theta_0 = \sqrt{\frac{Y}{Y+1}}\sin\alpha$, the Z-mode penetrates beyond the layer $X = 1$ and is reflected at the layer $X \approx (1 + Y)$. The theory assumes that some back scattering takes place, thus allowing part of the wave to return through the same path. This process does not require any collisions to be present. (Author)

AD-295 704 Div. 2, 8, 12
(TISTP/JW) OTS price $10.50

Texas Instruments, Inc., Dallas.
RADAR ANALYSIS OF THE MOON. PHASE I: FEASIBILITY OF LABORATORY SIMULATION.
Final rept.,
by Frank E. Kinsman and Jack R. Van Lopik.
30 Nov 62, 137p. incl. illus. tables, 113 refs.
(Contract AF 19(628)480, Proj. 7698)
(AFCRL 62-1120) Unclassified report

DESCRIPTORS: *Lunar probes, *Space environmental conditions, Simulation, Surfaces, Radiation effects, Terrain, Radar, Feasibility studies.

AD-295 711 Div. 2, 15
(TISTW/JEA) OTS price $5.60

Mathematics Research Center, U. of Wisconsin, Madison.
THE LEAST DENSITY OF A SPHERICAL SWARM OF PARTICLES, WITH AN APPLICATION TO ASTRONOMICAL OBSERVATIONS OF K. KORDYLEWSKI,
by Frederick V. Pohle. Dec 62, 48p. incl. illus.
(MRC Technical summary rept. no. 351)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Interstellar matter, *Particles, *Celestial mechanics, *Motion, *Statistical distributions, *Particle trajectories, Astrophysics, Energy, Differential geometry, Atmosphere, Solar system, Satellites, Configuration, Gravity, Stability, Theory, Comets, Velocity, Integrals, Moon, Earth, Clouds, Mathematical analysis, Analysis.

AD-295 728 Div. 2
(TISTP/JW) OTS price $1.10

Cornell U. School of Electrical Engineering, Ithaca, N. Y.
RADIO ASTRONOMY.
14 Dec 62, 3p. (Research rept. no. RS 43; Status rept. no. 25)
(Contract Nonr-40127)
Unclassified report

DESCRIPTORS: *Radio astronomy, Instrumentation, Radiometers, Scientific research.

AD-295 788 Div. 2, 8
(TISTA/VGW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE THRESHOLD OF OTHER WORLDS,
by L. Ksanformaliti. 3 Jan 63, 11p. incl. illus.
(Trans. no. FTD-TT-62-1465 from Radio, No. 3, pp. 10-12, 1963)
Unclassified report

DESCRIPTORS: *Astronomy, Polariscopes, Photomultipliers, Photometers, Thermocouples, Bolometers, Image converter tubes, Television, Translations, USSR, Electronic equipment.

AD-295 817 Div. 2
(TISTP/JW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
IS THERE A STORM ALONG THE AIR ROUTE,
by N. Makarov. 8 Jan 63, 8p. incl. illus.
(Trans. no. FTD-TT-62-1679 from Russian periodical, Grazhdanskaya Aviatsiya, No. 9, pp. 22-24, 1962)
Unclassified report

DESCRIPTORS: *Storms, Weather forecasting, USSR, Translations, Meteorology, Air traffic control systems.

AD-295 830 Div. 2, 30
(TISTP/FR) OTS price $2.60

Woods Hole Oceanographic Institution, Mass.
HEAT FLUX AND SURFACE STRESS ON AND NEAR AN ISLAND IN THE TRADE WIND REGION.
Semi-annual progress rept. no. 1, 5 June-5 Dec 62,
by E. B. Kraus. 5 Dec 62, 16p. illus.
(Contract DA 36-039-sc-90784)
Unclassified report

DESCRIPTORS: *Caribbean Islands, *Heat transfer, *Wind, Temperature, Ocean waves, Instrumentation, Buoys, Anemometers, Photographic recording systems, Measurement.

Preparatory work carried out to determine the heat and momentum flux on the windward and leeward side of a flat island across the tradewind stream is described. A brief theoretical recapitulation is followed by the description of newly developed wind, temperature and wave height recorders. Investigation to select a suitable island site is also described. (Author)

AD-295 842 Div. 2
(TISTP/FR) OTS price $8.60

Army Map Service, Washington, D. C.
RANGE ERROR ANALYSIS,
by Alice G. Sturdivant. Sep 62, 95p. incl. illus. tables, 2 refs. (Technical rept. no. 45)
Unclassified report

DESCRIPTORS: *Satellite vehicles, *Geodesics, Errors, Tracking.

The sample world-wide satellite tracking program carried out by the Army Map Service is presented. By using satellites with known heights and inclinations and the coordinates of known points on geodetic datums, the coordinates of unknown points were related to these datums. The known and unknown points used in each segment of the program are presented, and the probable error in the correction to each unknown point is given. This program is intended to be a theoretical problem for testing the range error analysis theory and equations and the resulting errors which would be associated with each determined position; therefore, the coordinates used for the known and unknown points were taken from maps and gazetteers and are only approximate. (Author)

AD-295 853 Div. 2, 8
(TISTP/GRW) OTS price $9.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
A STUDY OF PROCESSES IN THE IONOSPHERE BY MEANS OF GYRO-INTERACTION EXPERIMENTS CARRIED OUT WITH ROCKETS.
Final rept., 1 June 59-30 Apr 62.
Aug 62, 111p. incl. illus. 58 refs.
(Contract AF 19(604)5565)
(AFCRL 62-1071)
Unclassified report

DESCRIPTORS: *Ionosphere, *Atmospheric sounding, *Sounding rockets, Medium frequency, Radio transmitters, Electrons, Density, Test methods, Gas ionization, Magnetic field, Ionospheric propagation, Physical properties, Experimental data, Instrumentation.

AD-295 862 Div. 2
(TISTP/JW) OTS price $1.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
GROUND TEMPERATURE OBSERVATIONS AT FORT YUKON, ALASKA.
July 62, 14p. incl. illus. tables (Technical rept. no. 100)
Unclassified report

DESCRIPTORS: *Meteorological data, *Soils, Tables, Alaska, Temperature.

Division 3 - CHEMICAL WARFARE EQUIPMENT AND MATERIALS
Division 4 - CHEMISTRY

AD-295 883 Div. 2
(TISTP/JW) OTS price $2.60

Colorado State U., Fort Collins.
NATURE AND OBSERVATION OF HIGH-LEVEL TURBULENCE ESPECIALLY IN CLEAR AIR,
by Elmar R. Reiter. Dec 62, 28p. incl. illus. tables, refs. (Technical paper no. 41)
(Contract N189(188)55120A)
Unclassified report

Presented upon invitation by the Institute of Aerospace Sciences at its joint meeting with the American Meteorological Society, 21 Jan 63, New York.

DESCRIPTORS: *Meteorological data, *Atmosphere, Gravity, Supersonics, Perturbation theory, Fluid flow, Air, Turbulence.

AD-295 903 Div. 2
(TISTP/FR) OTS price $1.10

Microwave Lab., Stanford U., Calif.
(No title).
Interim final rept. for period ending 30 Nov 62, by P. A. Sturrock. 28 Dec 62, 4p.
(Contract AF 49(638)342)
Unclassified report

DESCRIPTORS: *Geophysics, Solar noise, Plasma physics, Extraterrestrial radio waves, Jupiter, Solar energy, Protons, Terrestrial magnetism, Magnetic fields, Sun, Scientific research.

Contents:
Type II and type III solar radio bursts
Irreversible processes in conservative systems
Generation of radio noise in the vicinity of the earth
Radio bursts from Jupiter
Interaction of the geomagnetic field with the solar corpuscular radiation
The solar magnetic field
Experimental reproduction of type III radio bursts
The solar wind

AD-295 985 Div. 2, 30
(TISTP/FRL) OTS price $1.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
VERTICAL MIGRATION OF PARTICLES IN FRONT OF A MOVING FREEZING PLANE,
by Arturo E. Corte. Jan 63, 8p. incl. illus. 2 refs. (Research rept. no. 105)
(Proj. 8X99-27-001-03)
Unclassified report

DESCRIPTORS: *Soils, *Particles, Low temperature research, Water, Motion, Freezing, Separation.

A principle of particle segregation by freezing is presented. It is demonstrated experimentally by using a transparent freezing cabinet in which a sample of distilled water freezes from the bottom upward. In this way the freezing front line travels vertically and the particles are carried against gravity. By using the same material with different shapes (glass beads and broken quartz or glass) it is demonstrated that an important factor in particle migration is the shape of the particle or its contact area with the interface. By testing other materials with different shapes and sizes, it is demonstrated that another important factor is particle size and rate of freezing. It is suggested that, for determining frost behavior of soils in permafrost regions, freezing from the bottom upward is a more reliable test than freezing from the top down. The implication of this principle in engineering and studies of soil genesis in cold regions is emphasized. (Author)

AD-295 987 Div. 2
(TISTW/PCR) OTS price $1.10

Aerospace Information Div., Washington, D. C.
MAGNETIC AND ELECTRICAL PHENOMENA IN OCEANS AND SEAS.
11 Jan 63, 2p. (AID rept. no. S-63-4; Trans. from Shuleykin, V. V. Magnetic and electric marine phenomena IN HIS: Ocherki po fizike morya (Studies on marine physics). Moskva, Izd-vo AN SSSR, pp. 410-466, 1962)
Unclassified report

DESCRIPTORS: *Oceans, USSR, Electromagnetic fields, Earth, Ocean currents, Magnetic storms, Aurorae, Magnetic properties, Electrical properties.

AD-295 988 Div. 2
(TISTW/PCR) OTS price $2.60

Aerospace Information Div., Washington, D. C.
PHENOMENA IN THE UPPER ATMOSPHERE. REVIEW OF SOVIET LITERATURE.
Monthly rept. no. 30 for Oct 62.
14 Jan 63, 23p. incl. illus. (AID rept. no. P-36-11)
Unclassified report

DESCRIPTORS: *Solar energy, *Cosmic rays, *Satellite vehicles, *Meteorology, *Upper atmosphere, USSR, Solar corona, Solar flares, Photometers, Solar eclipse, Antarctic regions, Conductivity, Terrestrial magnetism, Electrons, Oceans, Electrical properties, Ions, Geophysics, Ionosphere, Aurorae, Space environmental conditions, Bibliography.

Contents:
Solar radiation and the ionosphere
Van Allen belts and cosmic rays
Telluric currents
Satellite and missile data
Meteorology of the upper atmosphere

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

No Entries

4. CHEMISTRY

AD-295 124 Div. 4
(TISTP/JW) OTS price $1.60

RIAS, Inc., Baltimore, Md.
THE EFFECT OF SUBSTITUTION ON THE IONIZATION POTENTIALS OF FREE RADICALS AND MOLECULES. V. EXTENSION OF THE DENSITY MATRIX TREATMENT TO A TWO-BODY MODEL FOR ELECTRONS OUTSIDE A ''CORE'',
by Joyce J. Kaufman. Dec 62, 8p. 3 refs. (Technical rept. no. 9)
(Contract Nonr-347100, Proj. 356-433)
Unclassified report

DESCRIPTORS: *Ionization potentials, *Electrons, Ionization, Matrix algebra, Free radicals, Perturbation theory, Molecules, Density.

Extension has been made to a two-body model for a pair of electrons outside a 'core' of the treatment by density matrix formulism of a one-body model for an electron outside a 'core'. Delta sub k values (differences in ionization potentials between the parent compound) for the pi electron of alkyl radicals can be developed exactly as a one-body model problem in terms of density matrices. The derivation of the two-body model permits one quantum mechanically to describe the same delta sub k effects on the ionization potentials of an electron from the lone pair of substituted amines by an analogous treatment using the same perturbation Hamiltonian as for substituted alkyl radicals with two electron functions for the lone pair of the nitrogen. (Author)

AD-295 125 Div. 4
(TISTM/EJH) OTS price $1.10

RIAS, Inc., Baltimore, Md.
SOME THEORETICAL ASPECTS OF BONDING IN Xe-F COMPOUNDS,
by Joyce J. Kaufman. Dec 62, 8p. 11 refs.
(Technical rept. no. 10)
(Contract Nonr-347100, Proj. 356-433)
Unclassified report

DESCRIPTORS: *Xenon, *Fluorides, *Chemical bonds, Theory, Quantum mechanics, Rare gases.

Recent discovery of the XeF_4 stimulates considerable interest in the theoretical justification for the existence of such compounds. Theoretical conclusions which seem to be indicated include: (1) Xe and the higher rare gas Rn should both form rare gas fluorides because these two elements can rehybridize in various spd configurations (and both also have low lying unfilled orbitals available for electron back-donation from F). (2) He and Ne should not form rare gas fluorides because neither of these elements has the necessary valence shell d orbitals. Ar and Kr may or may not form rare gas fluorides. Their ionization potentials are higher than that of Xe so originally it will certainly be more difficult for fluorines to attract the necessary electrons. Ar and Kr also do not have low-lying f orbitals which might be critical if back donation to f orbitals is important. The only guide one has for formation of Ar and Kr compounds is that it has been shown that Xe, Kr and Ar will form complexes with CH_4 ($CH_4(+)$ is the isoelectronic analog of F). (Author)

AD-295 151 Div. 4, 7
(TISTM/EJH) OTS price $1.10

California U., Berkeley.
ELUCIDATION OF ELECTROCHEMICAL REACTIONS AND SYSTEMS.
Summary of progress for year ending 30 June 62,
by C. W. Tobias. 15 Jan 63, 8p.
(Contract N123(62738)23531A)
(NAVWEPS rept. no. 8135)
Unclassified report

DESCRIPTORS: *Electrodes, *Ammonia, *Calcium, *Electrolytic cells, Electrochemistry, Solutions, Thiocyanates, Ammonium radicals, Oxidation, Electric potential, Lead compounds, Nitrates, Liquefied gases, Transport properties, Porous materials, Electric currents, Power supplies, Lead.

Projects reported for fiscal year 1962 are concerned with reference electrodes for liquid ammonia systems, oxidation potential of calcium in thiocyanate-liquid ammonia solutions, and theoretical analysis of current distribution in porous electrodes. Studies in progress include physical properties of metallic solutions of ammonia, and electrode reactions in solutions of inorganic salts in dimethyl sulfoxide. (Author)

AD-295 156 Div. 4
(TISTM/SJR) OTS price $2.60

Manchester U. (Gt. Brit.).
THE THERMOCHEMISTRY OF TIN ALKYLS. THE HEATS OF COMBUSTION OF TIN TETRAMETHYL, TIN TETRAETHYL AND TRIMETHYLETHYL TIN.
Final technical rept. no. 1, 1 Oct 61-30 Sep 62,
by J. V. Davies and H. A. Skinner. 30 Sep 62,
23p. incl. tables.
(Contract DA 91-591-EUC-1748)
Unclassified report

DESCRIPTORS: *Thermochemistry, *Heat, Tin compounds, Ethyl radicals, Methyl radicals, Vinyl radicals, Benzyl radicals, Chromatographic analysis, Gases, Calorimeters, Heat of formation, Dissociation, Energy, Metal-organic compounds, Combustion.

The heats of combustion at 25 C (under 40 atm. oxygen pressure) of liquid tetramethyl tin, tetraethyl tin, and trimethylethyl tin were measured in a bomb calorimeter. Values for the standard heats of formation were derived from the combustion results. By combining these data with previously reported heats of bromination of various alkyl tin compounds, the heats of formation of trimethyl tin bromide, trimethyl tin iodide, trimethylphenyl tin, trimethylbenzyl tin, trimethylvinyl tin and hexamethyl distannane were obtained. (Author)

AD-295 426 Div. 4, 20
(TISTM/ODN) OTS price $7.60

Tracerlab, Inc., Richmond, Calif.
A STUDY OF TECHNIQUES FOR REACTOR EFFLUENT ANALYSIS.
Final rept., 15 June-15 Dec 60.
Dec 62, 70p. incl. tables.
(Contract AF 29(601)2852, Proj. 1448)
(AFSWC TDR 62-146) Unclassified report

DESCRIPTORS: *Nucleons, *Beryllium, *Uranium, *Radiochemistry, *Radioactive isotopes, Decontamination, Filter papers, Activated carbon, Molybdenum, Strontium, Ruthenium, Cesium, Barium, Yttrium, Cadmium, Neptunium, Particles, Mass spectrometers, Quantitative analysis.

Methods for quantitative analyses of effluent samples from direct-cycle, air-cooled nuclear reactors are presented. Methods were developed for analyses of beryllium and uranium at 10 to the -9th power gram levels in various collection media, and the level of beryllium and uranium present in the unexposed media was determined. Separation and decontamination schemes were developed for the detection of the following radionuclides: Mo-99, Sr-89, Sr-90, Ru-103, Ru-106, Cs-136, Cs-137, Ba-140, Y-91, Cd-115 and Np-239. Collection media investigated included several filter papers, canisters of activated carbon, and gummed paper. (Author)

AD-295 444 Div. 4
(TISTM/ODN) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INVESTIGATION OF THE RECOMBINATION PRODUCTS OF

Division 4 - CHEMISTRY

ALKYL RADICALS IN LIQUID-PHASE RADIOLYSIS OF n-HEXANE,
by N. A. Belikova, v. g. berezkin and L. S. Polak. 2 Nov 62, 16p. incl. tables, 10 refs. (Trans. no. FTD-TT-62-1270 from Neftekhimiya, 1:6, pp. 828-835, 1961)

Unclassified report

DESCRIPTORS: *Hydrocarbons, *Alkyl radicals, Nuclear isomers, Physical properties, Radiochemistry, Chromatographic analysis, Methyl radicals, Ethyl radicals, Gamma rays, USSR, Synthesis, Chemical reactions.

This report involves the composition of the dimer formed on radiolysis of pure liquid n-hexane and also n-hexane with admixtures of butylene at two temperatures. Investigation of the higher products of radiolysis of n-alkanes makes it possible to study the reaction of recombination of alkyl radicals, since the formation of heavy products involves a radical recombination stage. These reactions are practically the only ones in which alkyl radicals can participate; at the moment of formation they are not hot, and therefore all their reactions, which are secondary from the standpoint of radiochemistry, occur independently of their origin. The dimeric product should contain compounds which are a combination of two of the three possible hexyl radicals $CH_3-(CH_2)_4CH_2$, $CH_3(CH_2)_3CHCH_3$ and $CH_3(CH_2)_2CHCH_2CH_3$. In order to obtain standard reference compounds for the identification of the isomer composition of the dimeric product by the method of gas-liquid chromatography, all five possible dodecane isomers from recombination of the hexyl radicals were synthesized. (Author)

AD-295 467 Div. 4, 25
(TISTM/SJR) OTS price $2.75

Directorate of Materials and Processes, Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
LITERATURE SURVEY ON SYNTHESIS, PROPERTIES AND APPLICATIONS OF SELECTED BORIDE COMPOUNDS. Final rept. for 1 Feb-1 Aug 62 on Materials Applications,
by Barry R. Emrich. Dec 62, 122p. incl. illus. tables, refs.
(Proj. 7381)
(ASD TDR 62-873) Unclassified report

DESCRIPTORS: *Borides, Titanium compounds, Zirconium compounds, Hafnium compounds, Vanadium compounds, Niobium compounds, Tantalum compounds, Chromium compounds, Thorium compounds, High temperature research, Refractory materials, Deformation, Fracture (Mechanics), Hardness, Thermal conductivity, Electrical conductance, Thermal expansion, Corrosion, Stability, Crystal structure, Lattices, Density, Electron guns, Rocket motor nozzles, Gas turbine blades, Synthesis, Mechanical properties, Physical properties.

A comprehensive review of the literature was made to assist in providing background information needed for future work concerning boride materials. The materials reviewed included solid bodies of TiB_2, ZrB_2, HfB_2, VB_2, NbB_2, TaB_2, CrB_2 and ThB_4. This compilation presents information on synthesis, properties, and applications of the selected boride compounds, including selected abstracts and articles. This documentary search, by showing many gaps and wide scatter where information is available, demonstrates the need for the development of authoritative scientific information on borides applicable to future technological requirements. (Author)

AD-295 492 Div. 4, 25
(TISTP/TL) OTS price $1.60

RIAS, Inc., Baltimore, Md.
CALCULATION OF BASIC PARAMETERS NECESSARY FOR QUANTUM CHEMICAL CALCULATIONS ON BORON-CONTAINING MOLECULES. II. (pp/pp)B-AND VALENCE STATE ELECTRON AFFINITIES OF B-,
by Odilon Chalvet and Joyce J. Kaufman, Dec 62, 8p. 8 refs. (Technical rept. no. 8)
(Contract Nonr-347100; In cooperation with Centre de Mecanique Ondulatoire Appliquee, Paris, France)

Unclassified report

DESCRIPTORS: *Electrons, *Quantum mechanics, *Boron, *Atoms, Integrals, Ionization potentials, Series, Carbon, Valence, Chemical analysis, Molecules, Spectrographic analysis.

A modified one-center electron repulsion integral $(pp|pp)$ for B(-) which takes into account correlation effects has been calculated. For these calculations it was necessary to evaluate the electron affinities of B(-) to form B(--) in various valence states. This was done by adapting an existing rigorous extrapolation procedure to valence state calculations. The electron repulsion integrals were calculated by expansion of the energies of B, B(-), and B(--) as a function of spectroscopic term values. The value for $(pp|pp)$ of B(-) calculated in this manner, 4.737 ev, and the value calculated using the Pariser-Parr approximation, $(pp|pp) = I-A = 4.015$ ev, are quite close. This is especially gratifying in view of the fact that the two calculations are independent and that each calculation depends on extrapolated values for the electron affinities of B(-) in completely different valence states. (Author)

AD-295 585 Div. 4
(TISTM/ODN) OTS price $.50

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
THE DETERMINATION OF CHLORIDE ION CONCENTRATION IN INHIBITED ENGINE COOLANTS,
by Robert Wagner. 9 Jan 63, 6p. incl. tables, 9 refs. (Rept. no. CCL-135)
(DA Proj. 593-32-007)

Unclassified report

DESCRIPTORS: *Chlorides, *Coolants, Thiols, Azoles, Corrosion, Thiocyanates, Ammonium radicals, Alums, Hydrogen compounds, Silver compounds, Sodium compounds, Nitrates, Nitric acid, Ions, Chemical analysis.

It is important to determine the concentration of chloride ions in engine coolants, as their presence greatly accelerates corrosion of the system. The presence of mercaptobenzothiazole in inhibited coolants interferes with this determination. A method to determine chlorides in inhibited coolants is described. (Author)

AD-295 586 Div. 4, 14
(TISTM/ODN) OTS price $.50

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
INFLUENCE OF THE HLB OF A NONIONIC ADDITIVE ON THE DETERGENCY OF ALKALINE CLEANERS CONTAINING AN ANIONIC SURFACTANT,
by A. Mankowich. 10 Jan 63, 13p. incl. tables, 14 refs. (Rept. no. CCL-137)
(DA Proj. 593-32-007)

Unclassified report

DESCRIPTORS: *Detergents, *Wetting agents, *Cleaning, Surface tension, Sulfates, Alkyl radicals, Sulfonates, Penetration, Colloids, Asphalt, Metallic soaps, Sodium compounds, Fatty acid esters, Ethylenes, Oxides, Phosphates, Additives, Solutions.

The resultant of the combined properties of penetrability, peptization, and wetting, as judged by asphalt detergency, shows synergism on the addition of certain nonionics to medium pH alkaline cleaning solutions (capH12) containing an anionic surfactant. Nonionic additives with HLB values of 13.2 to 17.1 imparted good to excellent asphalt detergency to solutions containing sodium dodecyl sulphate (SDS) or alkyl (straight chain) aryl sulphonate (SKBS); and nonionics with HLB values of 13.4 to 18.18 gave fair to excellent asphalt removal in cleaners containing sodium oleate. In all three systems, asphalt detergency decreased with further increase in nonionic HLB to 19.05. The anionic with the highest HLB (SDS) formed the most synergistic mixtures in the 13.2 to 17.1 nonionic HLB range. Increasing HLB of the nonionic additives correlates in general with increasing surface tension of their 0.39% solutions; and the effectiveness of the nonionics in improving asphalt detergency increases with increasing values of nonionic surface tension until a nonionic HLB of 17.1 is reached. A number of synergistic anionic-nonionic surfactant combinations were developed. (Author)

AD-295 629 Div. 4, 25
(TISTM/SJR) OTS price $1.60

RIAS, Inc., Baltimore, Md.
CALCULATION OF BASIC PARAMETERS NECESSARY FOR QUANTUM CHEMICAL CALCULATIONS ON BORON-CONTAINING MOLECULES. I. ONE-CENTER ELECTRON REPULSION INTEGRAL (pp/pp)B,
by Joyce J. Kaufman and Gaston Berthier. Dec 62, 10p. 3 refs. (Technical rept. no. 7)
(Contract Nonr-347100, Proj. NR 356-433)
Unclassified report

DESCRIPTORS: *Boron compounds, *Valence, Physical chemistry, Quantum mechanics, Molecular structure.

A modified one-center electron repulsion integral (pp/pp) for boron which takes into account electron correlation effects was evaluated by expansion of the energies of the boron atom and its positive and negative ions as a function of spectroscopic term values. The values for (pp/pp)B calculated from two different pairs of valence states are very close: (pp/pp)B = 7.094 ev, and (pp/pp)B = 6.976 ev. (Author)

AD-295 672 Div. 4, 10
(TISTM/SJR) OTS price $1.60

Space Systems Div., Air Force Systems Command, Inglewood, Calif.
AN ACETYLATION METHOD FOR DETERMINING MIXTURES OF EITHER HYDRAZINE-1,1-DIMETHYLHYDRAZINE OR MONOMETHYLHYDRAZINE-1,1-DIMETHYLHYDRAZINE,
by Hugh E. Malone and Robert A. Biggers. Dec 62, 15p. incl. illus. tables, 12 refs.
(Rept. no. SSD TDR 62-203)
Unclassified report

DESCRIPTORS: *Hydrazines, Rocket fuels, Reaction kinetics, Acetylation, Acetic anhydrides, Electrolytic titration, Titration, Chemical indicators, Perchloric acid, Methyl hydrazines, Chemical analysis.

A method is presented for determining mixtures of either hydrazine-1,1-dimethylhydrazine (N_2H_4/UDMH) or monomethylhydrazine1,1-dimethylhydrazine (MMH/UDMH). This method is based on the difference in reaction rates for acetylating hydrazines. Both N_2H_4 and MMH react immediately while the acetylation of UDMH proceeds slowly. The reactions are conducted in an acetonitrile-acetic acid medium. Two titrations are required: one measures the total basicity of the hydrazine mixtures; the other titration measures UDMH after the N_2H_4 or MMH has reacted with Ac2O. (Author)

AD-295 766 Div. 4, 10
(TISTM/EJH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
COMBUSTION OF THE INORGANIC SALTS AMMONIUM IODATE AND HYDROXYLAMINE SULFATE,
by A. A. Shidlovskiy. 28 Dec 62, 10p. incl. tables, 13 refs. (Trans. no. FTD-TT-62-1604 from Zhurnal Prikladnoy Khimii, 35:3, pp. 511-516, 1962)
Unclassified report

DESCRIPTORS: *Combustion, *Decomposition, *Salts, *Inorganic substances, Ammonium radicals, Iodates, Sulfates, Hydroxides, Amines, Catalysts, Temperature, High pressure research, USSR.

It was demonstrated experimentally that the compounds ammonium iodate and hydroxylamine sulfate decompose with the evolution of a small quantity of heat (72 and 120 kcal/kg, respectively) and are not capable of stable combustion with a tube diameter of 2.0 cm at room temperature and atmospheric pressure. Combustion of these compounds occurs when: (1) catalysts (Cr, Mn, or Cu compounds) which increase their rate of thermal decomposition are added to them; (2) when the experiments are conducted at an elevated temperature (60-100 degrees); and (3) (when in the case of NH_4IO_3) the experiments are carried out under elevated pressure (120 atm). (Author)

AD-295 773 Div. 4
(TISTM/EJH) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
JOURNAL OF PHYSICAL CHEMISTRY (SELECTED ARTICLES).
10 Jan 63, 22p. incl. illus. tables, refs.
(Trans. no. FTD-TT-62-1462 from Zhurnal Fizicheskoy Khimii, 36:5, pp. 989-992, 1089-1094, 1962)
Unclassified report

DESCRIPTORS: *Ozone, *Alkali metal compounds, *Borohydrides, *Polarographic analysis, Electrochemistry, Reaction kinetics, Decomposition, Hydrolysis, Sodium compounds, Potassium compounds, Lithium compounds, Cesium compounds, USSR, Physical chemistry, Synthesis.

Contents:
Electrosynthesis of ozone
Polarographic study of borohydrides of alkali metals

AD-295 908 Div. 4
(TISTM/EJH) OTS price $3.75

Rock Island Arsenal Lab., Ill.
POLYMERIZATION OF ALLYL MONOMERS BY MEANS OF

Division 5 - COMMUNICATIONS
Division 6 - DETECTION

GAMMA RADIATION,
by W. Dennis McHenry. 14 Dec 62, 22p. incl. illus. tables, 15 refs. (Rept. no. 62-4163)
(Proj. 599-25-001)
Unclassified report

DESCRIPTORS: *Polymers, *Polymerization, *Allyl radicals, *Gamma rays, Alcohols, Acetates, Phenyl radicals, Ethers, Radiation effects, Molecular weight, Solubility, Infrared spectroscopy, Reaction kinetics.

5. COMMUNICATIONS

AD-295 107 Div. 5, 8
(TISTW/PCR) OTS price $3.60

Florida U. Engineering and Industrial Experiment Station, Gainesville.
STUDY OF ELECTRO-MAGNETIC PROPAGATION OF A TRANSIENT SIGNAL THROUGH SEA WATER,
by M. J. Larsen, O. R. Gano, and M. M. Newman. Dec 62, 30p. incl. illus. (Technical rept. no. 2)
(Contract Nonr-58010, Proj. NR 371-340)
Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Underwater radio reception, *Underwater radio transmission, Pulse generators, Pulse communication systems, Capacitors, Antennas, Loop antennas, Spheres, Aluminum, Pulse transmitters, Test methods, Tests, Frequency, Airborne, Power supplies, Photographs, Propagation, Sea water.

Reported are results of air-to-undersea transmission of a high-power pulse signal. A signal was produced by discharging a capacitor bank into a kite-supported antenna of lengths on the order of 3,000 feet. Signals were received by a loop antenna at a distance of approximately one nautical mile. Data were obtained for reception on the surface and at loop depths of five feet and ten feet. The results are compared with theoretical expectations using normal sea water conductivity values. Included is an expression for optimum propagation frequency as a function of ocean depth for loop antenna reception. Comment is made on the interface problem. (Author)

AD-295 133 Div. 5, 15
(TISTW/PCR) OTS price $3.60

Lincoln Lab., Mass. Inst. of Technology, Lexington.
CONFIDENCE INTERVALS AND SAMPLE SIZES IN THE MEASUREMENT OF SIGNAL AND NOISE POWERS, SIGNAL-TO-NOISE RATIOS AND PROBABILITY OF ERROR,
by Jerry Holsinger. 3 Jan 63, 42p. incl. illus. 9 refs. (Rept. no. 34G-9)
(Contract AF 19(628)500)
(AFESD TDR 63-12) Unclassified report

DESCRIPTORS: *Signal-to-noise ratio, *Signals, *Probability, *Statistical analysis, *Sampling, Distribution theory, Equations, Integral equations, Radio signals, Radar signals, Mathematical analysis, Power, Errors, Signals.

The estimation errors involved in both discrete and continuous estimates of certain parameters of a Gaussian random process is considered. For discrete estimates, the confidence interval concept is used to obtain probabilistic bounds on the estimation errors. Roughly analogous results are also obtained for continuous estimates. The bounds obtained are useful for: (a) determining the accuracy of an estimate given the value of the estimate and the number of samples used (or for the continuous case the effective TW), and (b) for determining roughly the number of samples required (or the effective TW) to provide an estimate of a specified accuracy. The bounds are presented graphically and examples of their use are given. A second result is the derivation of an approximate, but convenient and reasonably accurate, method for evaluating the non-central t-distribution by means of tables of the normal distribution. This allows certain calculations to be made that are not now possible with existing tables. (Author)

AD-295 650 Div. 5
(TISTP/JW) OTS price $3.60

RAND Corp., Santa Monica, Calif.
DATA TRANSMISSION ERRORS: COMPARISON OF LF RADIO WITH TELEPHONE FACILITIES,
by P. Mertz. Jan 63, 33p. incl. illus. 13 refs.
(Memo. no. RM-3413-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Data transmission systems, *Noise, Distribution, Radio waves, Telephone communication systems, Errors, Atmospherics.

The expected error distribution in the data system, coming from the LF atmospheric noise, illustrates a double type of distribution which has been encountered before. This approaches a purely random or Poisson type of distribution for shorter intervals of time, but approaches a bunched or hyperbolic type of distribution over the long run. The specifications on error performance appear at first to be generous and lenient, but they really describe a data transmission system which is of quite high grade. This is primarily because the tolerances allow only a small interval of time during which the performance can be relatively poor. The effect is enhanced also by the longer-time distribution approaching the hyperbolic law. This gives a greater ratio than a purely random distribution would, between peak and average incidence of errors. The long-time curve fits in pretty well with curves obtained from data on a variety of telephone facilities. It differs from them, first in following a much more systematic seasonal and hour-of-the-day trend, and second in not conforming so well to a strict hyperbolic law. (Author)

6. DETECTION

AD-294 923 Div. 6, 8
(TISTW/JEA) OTS price $3.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
AN INVESTIGATION OF THE OUTPUT OF A GAS LASER WITH VARIATION OF PARAMETERS.
Master's thesis,
by John Davis Hunsuck. Dec 62, 30p. incl. illus. table, 8 refs. (Rept. no. GE/EE/62-9)
Unclassified report

DESCRIPTORS: *Lasers, Pulse integration, Discharge tubes, Design, Gas discharges, Reflectors, Temperature, Mirrors, Reflection, Pumps, Energy, Light pulses, Stability, Neon, Helium, Construction.

The need for construction of a gas laser is discussed. Design criteria and accuracy of adjustments of the laser are established. The

requirement of temperature compensation of the laser is discussed. The final design of the gas laser is described. The theory of operation of the helium-neon gas laser is outlined. The derivation of field distribution in the laser interferometer is given. Mode patterns of the output are discussed. Stability of the laser is given. Further studies that are possible with the laser are outlined and discussed. (Author)

AD-294 962 Div. 6, 25
(TISTW/JEA) OTS price $9.10

AVCO Marine Electronics Office, New London, Conn.
UNDERWATER SOUND TRANSMISSION,
by H. W. Marsh and M. Schulkin. Nov 62, 95p. incl. illus. tables, 132 refs.
Unclassified report

DESCRIPTORS: *Underwater sound transmission, *Underwater sound equipment, *Sound transmission, *Underwater sound, Ocean bottom, Measurement, Velocity, Intensity, Bubbles, Scattering, Attenuation, Physical properties, Sonar, Climatic factors, Sonar interception, Sound bearing finders, Energy, Power, Propagation, Sources, Sea water, Sound ranging, Multipath transmission, Absorption, Oceans.

Research is presented on a physical representation of the ocean, together with constants and equations sufficient to permit a reasonable calculation of the average sound field. In addition, it discusses other features of the sound field, and hints at some new methods of calculation using the physical picture. A review is given of the state of knowledge concerning underwater sound transmission from its status in 1946, to its present state. A discussion of recent advances and studies in several important areas is made. An oceanographic acoustic description of the physical environment of underwater sound is proposed in outline form. (Author)

AD-294 966 Div. 6, 15, 30
(TISTW/PCR) OTS price $5.60

Anti-Submarine Warfare Lab., Naval Air Development Center, Johnsville, Pa.
THE APPLICATION OF A TRANSFORMATION TECHNIQUE FOR THE SIMPLIFICATION OF MATHEMATICS ASSOCIATED WITH THE ASW PROBLEM,
by E. M. Goldberg. 31 Dec 62, 46p. incl. illus. tables (Rept. no. NADC-AW-6239)
(WEPTASK no. RUSD3B000/2021/F004-02-01)
Unclassified report

DESCRIPTORS: *Transformations (Mathematics), *Antisubmarine warfare, Mathematical analysis, Conformal mapping, Digital computers, Trigonometry, Functions, Geometry, Algebraic geometry, Integral transforms, Differential equations, Submarines, Detectors, Airborne, Programming, Radio sono buoys.

A procedure is developed, based on conformal mapping techniques, for efficiently determining the points of intersection of conic sections. In particular, the configurations dealt with here are (1) the determination of the intersections of a hyperbola and ellipse with common foci; and (2) the intersection of two ellipses, or equivalently an ellipse and a hyperbola with a common focus. (Author)

AD-294 967 Div. 6, 16
(TISTB/DGH) OTS price $3.60

United Research, Inc., Cambridge, Mass.
LOCALIZATION OF SOUND. PART 2. THE MECHANISMS OF HUMAN LOCALIZATION OF SOUNDS WITH APPLICATIONS IN REMOTE ENVIRONMENTS.
Dec 62, 34p. incl. illus. 10 refs.
(Contract N123(60530)27872A)
(NOTS TP 3109, pt. 2)
Unclassified report

DESCRIPTORS: *Sound bearing finders, *Ear, *Acoustic detectors, Hearing, Experimental data, Design, Auditory perception, Simulation, Sound ranging.

The role of the pinnae, or external ears, in human localization of sounds is briefly reviewed. Additional experiments are described which support the theoretical viewpoint. Subsequent development work to produce aural coupling in both the air and water environments is reported and conclusions drawn from tests made. It has been shown that coupling to both environments is possible using pinnae to introduce the required transformation which depends on relative orientation of sound source and pinna. Understanding the mechanism of localization has provided insight into other related domains; namely, speech recognition and speech intelligibility. These are discussed briefly. (Author)

AD-294 972 Div. 6, 12
(TISTW/JEA) OTS price $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIVISION 7. ENGINEERING.
Quarterly progress rept., 1 Oct-31 Dec 62. 15 Jan 63, 14p. incl. illus.
(Contract AF 19(628)500)
(AFESD TDR 63-11) Unclassified report

DESCRIPTORS: *Re-entry aerodynamics, *Dipole antennas, *Optical instruments, Satellite vehicles, S band, X band, L band, Tracking telescopes, Mirrors, Radar tracking, Optical systems, Analog computers, Analysis, Re-entry vehicles, Radiometers, Antennas, Analog systems, Guided missile research, Optical tracking, Satellite vehicle research, Radar equipment, Ultra high frequency, Design.

A summary is presented of the principal engineering activities, such as the upgrading of the Millstone Hill radar facility to L-band, fabrication and installation of the new research facilities at Haystack Hill, design of optical equipment for installation in a KC-135 aircraft as part of the PRESS program and development of dispensing equipment for the West Ford program. (Author)

AD-294 996 Div. 6, 2
(TISTW/JEA) OTS price $1.10

Aerospace Information Div., Washington, D. C.
RADAR METHODS OF METEOR OBSERVATION (Radiolokatsionnyye Metody Nablyudeniya Meteorov),
by Ye. I. Fialko. 23 Jan 63, 3p. (AID rept. no. S-63-17; Trans. from Izd-vo "Sovetskoye Radio, p.111, 1961, Moscow)
Unclassified report

DESCRIPTORS: *Radio transmission, *Meteors, *Radar tracking, Radar echo areas, Radar echo simulators, Scattering, Radio interference, Atmosphere, Ionization potential, USSR, Ionospheric disturbances, Atmosphere entry.

A review of Soviet and non-Soviet information on radar methods of meteor observation and investigation is given. The following topics are discussed: the use of radio astronomy for the observation of meteors, certain problems in radiophysics and geophysics, and the radio-engineering aspects of radar methods of meteor observation. (Author)

Division 6 - DETECTION

AD-295 044 Div. 6
(TISTW/PCR) OTS price $4.60

RAND Corp., Santa Monica, Calif.
A BROAD LOOK AT THE PERFORMANCE OF INFRARED DETECTORS,
by R. W. Gelinas and R. H. Genoud. 11 May 59, 41p. incl. illus. tables, 12 refs. (Rept. no. P-1697)
(In cooperation with Hughes Aircraft Co., Culver City, Calif.)
Unclassified report

Presented at the conference on infrared detectors, 3-4 June, held at Syracuse University, N. Y.

DESCRIPTORS: *Infrared detectors, *Infrared radiation, Time, Correlation techniques, Mathematical analysis, Equations, Black body radiation, Signal-to-noise ratio, Photoconductivity, Theory, Power.

The capabilities of present day infrared detectors from a more or less absolute viewpoint, i.e., in terms of radiant power and time are discussed. The intent was purposely to suppress many of the fine points in order to attain a perspective of the subjects. This method of approach starts with a derivation of the performance limits for ideal detectors, thus establishing a basis of comparison for real detectors. The derivations include both the limits set by background fluctuations and by signal fluctuations. Next some recent data on detector performance are reduced to a form allowing intercomparisons. Our method stresses the fundamental fact that the minimum detectable power is directly related to the time taken for the detection process or, more loosely, to the time constant of the detector. (Author)

AD-295 076 Div. 6, 15
(TISTW/PCR) OTS price $3.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
COHERENT DETECTION ON PULSED RADARS,
by Anthony Kerdock. June 62, 33p. incl. illus. 4 refs. (Research rept. no. PIBMRI-1103-62)
(Grant AFOSR 62-295) Unclassified report

DESCRIPTORS: *Radar pulses, Theory, Statistical analysis, Radar targets, Velocity, Radar, Probability, Crystal oscillators, Magnetrons, Signal-to-noise ratio, Integral equations, Integrators.

Coherent detection on a pulsed radar is discussed from a statistical decision theory viewpoint. The Neyman Pearson test is applied to two cases; first, where it is desired to detect targets moving with one particular radial velocity, and second, where it is desired to detect targets at all velocities equally well. In the first case it is shown that, in a sense an ideal integrator is achieved; i.e., the results are exactly the same as if all the power reflected from the target were received in one pulse, rather than many. A mechanization for the second case is given. The statistics for a suboptimum integrator which approximates the Neyman Pearson test in a simpler form are derived. The performance of this integrator is compared with that for the ideal noncoherent integrator. (Author)

AD-295 106 Div. 6
(TISTA/FRL) OTS price $1.10

Oslo U. (Norway).
CONSTRUCTION AND OPERATION OF OSLO SPACE TRACK STATION.
Final rept. (Supplement), 15 Apr 59-1 Oct 62, by Hallvard Rosseland. 25 Oct 62, 9p. incl. tables (Suppl. to AD-270 091)
(Contract AF 61(052)240)
(ESD TDR 62-336, Suppl. 1)
Unclassified report

DESCRIPTORS: *Optical tracking, *Solar observatories, *Satellite vehicles, Norway, Photographic equipment, Ground support equipment, Construction, Operation, Cameras, Position finding, Time, Optical equipment.

The report covers the construction and operation of optical precision tracking of artificial earth satellites at the Oslo Space Track Facility. The Institute of Theoretical Astrophysics observes satellite transits for which data have been supplied by the U.S. Air Force, using a Baker-Nunn Satellite Tracking Camera. (Author)

AD-295 192 Div. 6
(TISTW/JEA) OTS price $2.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
(No title).
Quarterly status rept., 1 June-31 Aug 61, 1 Sep 61, 23p. incl. illus. (Rept. no. 1116-13)
(Contract AF 19(604)7270)
Unclassified report

DESCRIPTORS: *Radar echo areas, *Structural shells, *Ionospheric disturbances, *Dielectric properties, Ionosphere, Refraction, Frequency, Spheres, Reflections, Refractive properties, Radiation effects, Ionization, Programming, Computers, Plasma physics, Configurations, Dielectrics, Re-entry aerodynamics, Coatings.

A rapidly moving vehicle traveling through the ionosphere will disturb the distribution of charged particles and cause the electromagnetic properties of the vehicle to be modified. The scattering properties of such bodies in the perturbed ionized medium have been under investigation. The approach was to determine the pertinent scattering mechanisms and to apply this knowledge in determining approximate methods for calculating the echo area. These methods were applied to the simplified case of calculating the echo area of the concentric dielectric-clad sphere. This configuration was chosen since an exact solution for this echo area could be obtained and programmed on the IBM 704 computer. This exact solution was used to find the region of validity of the approximate solutions that were evolved. The approximate solutions, once their limitations are understood, could then be applied to dielectric-clad bodies of arbitrary shape. No such extension is possible for the exact solution. The approximate solutions were remarkably successful with only a few regions for which additional research is still required in order to find the desired echo area. (Author)

AD-295 415 Div. 6, 12, 7
(TISTW/JEA) OTS price $4.60

Air Force Proving Ground Command, Eglin Air Force Base, Fla.
GLOBAL SEARCH AND RECOVERY. A FEASIBILITY STUDY OF COMPUTER SIMULATION,
by Russell Fanning. Nov 62, 47p. incl. illus. tables, 3 refs. (Rept. no. APGC TDR 62-44)
(Proj. 7993)
Unclassified report

DESCRIPTORS: *Computers, *Satellite vehicles, *Aircraft, Probability, Feasibility studies, Geometry, Model tests, Global flight, Surface area, Climatic factors, Topology, Trigonometry, Plan position indicators, Search radar, Simulation, Programming, Recovery, Position finding.

The subject of computer simulation was chosen for this feasibility study as this aspect does not appear to have been well covered during previous studies of the Global Search and Recovery problem. A mathematical model was constructed of a simulated search and recovery mission, and a computer program was constructed which embodied this model. The objective of this computer program was the determination of the probability of successfully retrieving a downed object when given information as to the probable location, the nature and deployment of search and recovery facilities, and a geographic and political description of the earth. Considerable attention was given to developing a convenient means of entering and varying the parameters of the model in a systematic manner. The results of this study indicate that it would be feasible to construct a computer model of at least certain aspects of the search and recovery problem which would be suitable for studies of the effects of several parameters. However, the model described is believed to be too limited and inflexible in form (though not in parameter values) to permit generalization to a larger variety of search and recovery problems. Future work along this line should probably employ a Monte Carlo type approach. (Author)

AD-295 458 Div. 6, 2
(TISTW/JEA) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A PULSED ULTRASONIC THERMOANEMOMETER,
by N. P. Fateyev. 15 Jan 63, 3p. incl. illus.
(Trans. no. FTD-TT-62-118 from Russian Patent No. 134920 (645314/26) 21 Nov 1959)
Unclassified report

DESCRIPTORS: *Anemometers, *Airstream direction detectors, Pulse integrators, Pulse amplifiers, Ultrasonic properties, Sonar receivers, Frequency, USSR, Humidity, Temperature, Temperature sensitive elements, Ultrasonics, Pulse integration.

Instruments for measuring the temperature of an air stream cannot exclude the influence of the stream on the results of the measurement because of possible dynamic heating of the sensitive element, and also the influence of the temperature and humidity of the medium. The proposed instrument--a pulsed ultrasonic thermoanemometer-based on the same principle of measurement does not have the indicated defects because a device is used in it which adds the frequencies of pulse repetition in two channels. The pulsed ultrasonic thermoanemometer comprises an oscillator, two controlled cascades to which are connected ultrasonic pulse generators, two amplifiers with two sound receivers as their input, and meters for the difference and sum of the frequencies of the oscillations entering both channels. (Author)

AD-295 464 Div. 6, 8
(TISTW/JEA) OTS price $1.00

Bolt, Beranek and Newman, Inc., Cambridge, Mass.
STUDY OF A SONIC LOAD RECORDER.
Interim rept., Jan-July 62 on Dynamic Problems in Flight Vehicles,
by Jay H. Ball, Norman Doelling and others.
Nov 62, 118p. incl. illus. tables, 15 refs.
(Contract AF 33(616)7789, Proj. 1370)
(ASD TDR 62-165, vol. 1)
Unclassified report

DESCRIPTORS: *Acoustic detectors, *Recording systems, *Noise analyzers, *Errors, *Jet engine noise, *Rocket motor noise, Jet planes, Fatigue (Mechanics), Noise, Amplitude modulation, Frequency, Acoustic filters, Aircraft, Transducers, Power supplies, Sonar receivers, Jet engines, Vibration, Temperature, Sound, Sonar, Propagation, Detection.

The feasibility of a compact instrument to measure the accumulated acoustic exposure of a flight vehicle is considered. The output data of the instrument will aid the estimation of fatigue life. A study of the conditions and parameters involved together with general requirements of the instrument is presented. Design criteria are discussed such as techniques for amplitude analysis, sampling and accumulation of data in a directly readable and usable form. A specific design of a breadboard model of the sonic recorder is given with test and performance data under laboratory conditions. A discussion of the effects of temperature, vibration, and power supply variations is also included. Complete circuit diagrams are provided. (Author)

AD-295 634 Div. 6, 25
(TISTE/OHD) OTS price $1.60

Ordnance Research Lab., Pennsylvania State U., University Park.
TRANSDUCER POWER OUTPUT OBTAINED FROM NEAR-FIELD PRESSURE AMPLITUDE AND PHASE MEASUREMENTS,
by F. B. Stumpf. 1 Feb 63, 12p. incl. illus.
10 refs. (Serial no. NOrd 16597-94)
(Contract NOrd-16597)
Unclassified report

DESCRIPTORS: *Transducers, *Power, *Underwater sound generators, Sound transmission, Test equipment, Pressure, Analysis, Phase measurement, Measurement.

The calculation of acoustic power from near-field measurements of piston-type transducers is described, and the results are compared with those calculated from far-field measurements under the same conditions. The near-field measurements, which are required when transducers are calibrated in small-volume pressure tanks, are of two types: axial-pressure measurements, and radial-pressure measurements in a plane near the active face. It is shown that the axial-pressure method is superior for reasons of simplicity in measurement and calculation. (Author)

AD-295 895 Div. 6, 25
(TISTW/JEA) OTS price $2.25

Electro-Optical Systems, Inc., Pasadena, Calif.
A SOURCE AND DETECTOR OF RADIATION IN THE WAVELENGTH REGION 1500-50 ANGSTROMS SUITABLE FOR RADIATION EFFECTS STUDIES ON MATERIALS IN VACUO. PART II. A STUDY OF VACUUM ULTRAVIOLET RADIATION EFFECTS ON MATERIALS IN VACUO OF ORDER 10 TO THE -9th MM Hg.
Rept. for 20 Dec 60-30 Sep 61 on The Chemistry and Physics of Materials,
by Horace R. Moore, H. Bernstein, and R. S.

Reynolds. Dec 62, 79p. incl. illus. tables, 2 refs.
(Contract AF 33(616)6488, Proj. 7360)
(WADD TR 60-371, pt. 2)
Unclassified report

DESCRIPTORS: *Ultraviolet radiation, *Ionization chambers, *Photomultipliers, *Optical systems, *Radiation effects, *Space environmental conditions, Cylindrical bodies, Silicon, Solar cells, Resistance, Aluminum compounds, Metallic coatings, Mirrors, Plasma physics, Pumps, Metallic compounds, Ultraviolet detectors, Dielectrics, Semiconductors, Spectrophotometers, Photoemission, Spectrographic analysis, Gas ionization, Electron optics, Detection, Vacuum systems, Sources, Simulation.

7. ELECTRICAL EQUIPMENT

AD-294 924 Div. 7
(TISTE/OHD) OTS price $6.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
AN EXPERIMENTAL EXAMINATION OF RETROGRADE MOTION OF AN ELECTRIC ARC.
Master's thesis,
by David R. James. Dec 62, 58p. incl. illus. tables, 17 refs. (Rept. no. GE/EE/62-10)
Unclassified report

DESCRIPTORS: *Electric arcs, *Magnetic fields, Magnetic moments, Magnetic effects, Theory, Electrostatic fields, Deflection, Ionic current, Test equipment, Argon, Pressure, Theses, Air force research.

Under certain conditions, particularly under reduced pressures, electric arcs in a transverse magnetic field move in a direction opposite to that predicted by conventional electromagnetic formulae. This phenomenon is called retrograde motion. Several widely varying theories have been made to help confirm or refute the proposed theories. Additional data is presented here in an area not previously investigated. Implications of these and other observations as they pertain to a comprehensive theory are discussed together with an analysis of what a truly quantitative investigation must encompass. (Author)

AD-295 052 Div. 7
(TISTW/RD) OTS price $6.60

Radio Corp. of America, Lancaster, Pa.
THE DEVELOPMENT OF AN AUXILIARY ELECTRODE THERMIONIC CONVERTER.
Quarterly technical rept. no. 4, 15 Sep-15 Dec 62,
by W. B. Hall and J. J. O'Grady. Jan 63, 54p. incl. illus. tables.
(Contract AF 33(657)8005, Proj. 8173)
Unclassified report

DESCRIPTORS: *Thermoelectricity, *Power supplies, *Auxiliary power plants, Electrodes, Cesium, Ceramic materials, Electric power production, Space flight.

Progress is reported on research conducted to improve the efficiency and life expectancy of thermionic energy converters for space applications. The program has been modified to the development of a cylindrical converter, the emitter of which is thermally bonded to but electrically insulated from a central heat-source tubing carrying liquid metal. Significant progress has been achieved in the various portions of the program. A particular geometry employing the Cross-Current Converter principle was selected and the overall design has been determined. Two promising methods for the application of the emitter insulation are being evaluated. The effects of cesium on ceramics at the various temperatures of interest were observed and the results analyzed. (Author)

AD-295 056 Div. 7
(TISTM/EJH) OTS price $6.60

Heliotek Div., Textron Electronics, Inc., Sylmar, Calif.
HIGH EFFICIENCY SILICON SOLAR CELLS.
Quarterly progress rept. no. 1, 15 June-15 Sep 62 on Investigation for the Improvement of High Efficiency Silicon Solar Cells for Terrestrial Applications,
by Paul A. Berman, Roland J. Handy, and G. Perry Rolik. 15 Sep 62, 1v. incl. illus. table.
(Contract DA 36-039-sc-90777, Proj. 3A99-09-002)
Unclassified report

DESCRIPTORS: *Solar cells, *Silicon, *Power supplies, Configuration, Manufacturing methods, Diffusion, Photoelectric cells, Mirrors, Resistance, Electrical properties, Crystals, Circuits, Light, Solar energy, Intensity, Design.

Preliminary experiments were performed on N/P and P/N cells having various junction depths to determine the effects of light intensity on cell performance for various cell configurations. Preliminary results indicated that cells diffused twice as long as standard production-type cells operate more efficiently at the higher solar intensities. The shallow diffused cells had higher short circuit currents indicating higher potential efficiencies with the use of optimized grid designs to further reduce series resistance. Theoretical calculations were carried out to determine the optimum grid configuration for shallow-diffused cells. Results indicated that the optimum grid spacing is very insensitive to changes in light level if all other variables are held constant. The grid spacing does, however, change significantly with various A-factor values. Possibly through this mechanism the optimized grid spacing changes as a function of light level. A detailed solar cell equivalent series resistance circuit is presented. Studies were made to determine where the cell series resistance is located and which locations are more important with respect to the reduction of the total series resistance. (Author)

AD-295 155 Div. 7, 8, 26
(TISTE/CRJ) OTS price $1.10

Sprague Electric Co., North Adams, Mass.
PRODUCTION ENGINEERING MEASURE FOR SUBMINIATURE TEMPERATURE-COMPENSATING CERAMIC CAPACITORS.
Quarterly rept. no. 6, 13 Sep-12 Dec 62,
by J. H. Fabricius and J. H. D. Folster.
12 Dec 62, 15p. incl. tables.
(Contract DA 36-039-sc-85996)
Unclassified report

DESCRIPTORS: *Ceramic capacitors, *Subminiature electrical equipment, *Manufacturing methods, Capacitors, Temperature, Ceramic materials, Electrostatic capacitance, Life expectancy, Binders, Sprays, Production.

The temperature coefficient of capacitance requirement for the NPO formulation is under study. Pilot-run production on Case Size I and Case Size II units of the N750 and N1400 formu-

lations was begun. A description is presented of the work done on the development of spraying and dipping slips made with the N1400 formulation and the preferred binder. The achievement of satisfactory dipping slips with the N1400 formulation and the alternate binder is also reported. Final qualification test results on Case Size II and incomplete test results on Case Size III are presented. (Author)

AD-295 443 Div. 7, 9
(TISTW/JEA) OTS price $10.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ELECTROSTATIC GENERATORS (SELECTED PARTS) (Elektrostaticheskiye Generatory).
3 Dec 62, 131p. incl. illus. tables, refs.
(Trans. no. FTD-TT-61-416 from Izdatel'stvo Glavnogo Upravleniya Po Ispol'zovaniyu Atomnoy Energii Pri Sovete Ministrov SSR Moskva, pp. 15-22, 32-45, 56-89, 113-182, 1959)
Unclassified report

DESCRIPTORS: *Hydrogen ion concentration, *Electrostatic generators, *Gas flow, High frequency, Power transformers, Targets, Electron beams, Electrochemistry, Transformations, Design, Mercury compounds, Voltmeters, Carbon dioxide, Nitrogen, Hydrogen, Voltage, Accelerators, USSR, Sources, Compressible flow, Ion sources, Dielectric properties.

Contents:
Formation of a beam of negative hydrogeh ions by recharging of positive ions in the cathode channel of a high-frequency source
Formation of negative helium, carbon, oxygen, and chlorine ions on passage of positive ions through a supersonic jet of mercury vapor
Investigation of the dielectric strength of certain compressed gases and gaseous mixtures by means of an electrostatic generator
Voltage stabilization of high-current direct-action accelerators
High-frequency sources for electrostatic generators
Ion sources for electrostatic generators in compressed gas
Source of negative hydrogen ions for an overcharging electrostatic generator

AD-295 485 Div. 7, 26
(TISTM/EJH) OTS price $2.00

Harshaw Chemical Co., Cleveland, Ohio.
RESEARCH ON SOLAR-ENERGY CONVERSION EMPLOYING CADMIUM SULFIDE. VOLUME II.
Final rept., Jan-Aug 62,
by F. A. Shirland, G. A. Wolff and others.
Dec 62, 63p. incl. illus. tables, 10 refs.
(Contract AF 33(616)7528, Proj. 8173)
(ASD TDR 62-69, vol. 2) Unclassified report

DESCRIPTORS: *Solar cells, *Thin films, *Power supplies, Cadmium compounds, Sulfides, Single crystals, Crystals, Crystal structure, Vapor plating, Metallic smoke deposits, Molybdenum, Foils, Electrochemistry, Manufacturing methods, Resistance, Radiation damage, Growth, Solar energy, Spaceships.

Continued development of a thin-film solar cell using vacuum-evaporated layers of CdS is summarized. Primary emphasis was on the front wall CdS film cell using molybdenum foil substrates. Efficiencies of large-area (up to 9 sq. in.) front wall cells were increased to the range of 2 to 3%. The major factor in this increase was the reduction of sheet resistance by the use of a fine-mesh metallic grid laminated to the barrier surface. Improved vacuum evaporation techniques made possible a reduction in CdS film thickness and in molybdenum foil substrate thickness, each to about 0.001 in. With these improvements, power-to-weight ratios for CdS thin film front wall solar cell arrays, that may be suitable for space applications, of 20 to 30 watts/lb seem assured. Some tests of CdS front wall film cells and arrays indicate that they should be stable in the high vacuum of space, and possibly fairly resistant to radiation of the Van Allen types. Research studies on the structure of CdS single crystals and polycrystalline films continued regarding grain growth, orientation and polarity effects, etching, and grain boundary studies. There are indications of a correlation between crystallite orientation and photovoltaic response. (Author)

AD-295 490 Div. 7
(TISTA/FRL) OTS price $2.75

General Electric Co., Philadelphia, Pa.
CAVITY VAPOR GENERATOR PROGRAM.
Final rept., June 61-Sep 62,
by D. L. Purdy, R. C. Keyser and others.
Dec 62, 138p. incl. illus. tables, 6 refs.
(Contract AF 33(616)8394, Proj. 8173)
(ASD TDR 62-899) Unclassified report

DESCRIPTORS: *Generators, Solar energy, Solar cells, Design, Tests, Vacuum systems, Theory, Thermionic emission.

A description is presented of the theoretical study, design, and test of a thermionic generator utilizing solar energy concentrated by means of a parabolic collector. The generator produced 21.25 watts at a cathode temperature of 1773 K in solar test with a five foot diameter, sixty degree rim angle, parabolic collector. Expected future performance of solar thermionic systems is discussed. (Author)

AD-295 558 Div. 7, 25, 26
(TISTM/EJH) OTS price $2.50

RCA Defense Electronic Products, Princeton, N. J.
SOLAR CELL ARRAY OPTIMIZATION.
Rept. no. 3 (final), Oct 61-June 62 on Photostatic Energy Conversion Techniques.
Dec 62, 94p. incl. illus. tables, 5 refs.
(Contract AF 33(616)7415, Proj. 8173)
(ASD TR 61-11, vol. 3) Unclassified report

DESCRIPTORS: *Solar cells, *Crystals, *Power supplies, Photoelectric cells, Cadmium compounds, Sulfides, Semiconductors, Thin films, Photoelectric materials, Radiation damage, Protons, Electrons, Manufacturing methods, Resistance, Electrical properties, Plastics, Films, Design.

Research of photovoltaic materials has shown the feasibility of fabricating cells with the p-n junction far removed from the surface by means of heterogeneous cell formation, of fabricating cells by the silk-screen technique of applying the active material, and also has shown that CdS polycrystalline cells are more resistant to 1.6 Mev protons and to 0.8 Mev electrons than are n-on-p silicon cells. Five cells of small area were fabricated and demonstrated the feasibility of making cells from converted CdS layers. The maximum efficiency of these cells was about 0.7%. Three specimen arrays composed of four-inch-square cells totalling 2 sq. ft. in area were delivered. Reproducibility in performance of four-inch-square cells was improved to the extent that the last 5 cells fabricated exhibited conversion efficiencies of at least 1% with the efficiency of the best cell at 1.4%. This efficiency is to be compared with the maximum efficiency of 5.7% obtained for small-area cells

of 0.2 sq. cm. One array, which contained 5 cells, demonstrated the potential of integrated circuitry for large-area cells to overcome the high sheet resistance inherent in all large-area cells. This array also demonstrated the use of 0.002-inch flexible plastic as cell substrate providing power density of 5 to 7 watts per pound. (Author)

AD-295 732 Div. 7, 31
(TISTM/SJR) OTS price $2.60

Rotron Mfg. Co., Woodstock, N. Y.
THE DEVELOPMENT OF GAS LUBRICATED BEARINGS FOR USE IN BLOWER MOTORS.
Interim development rept. 7 June-7 Dec 62. 7 Dec 62, 27p. incl. illus. table, 29 refs. (Contract NObsr-87522)
Unclassified report

DESCRIPTORS: *Blowers, *Electric motors, Design, Journal bearings, Shielding, Contamination, Test equipment, Test methods, Gas bearings.

AD-295 764 Div. 7
(TISTE/OHD) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
KLYDONOGRAMS OF INTERACTING ELECTRODES,
by V. I. Arabadzhi and K. I. Rudik. 28 Dec 62, 7p. incl. illus. 1 ref. (Trans. no. FTD-TT-62-1540 from Izvestiya Vysshikh Uchebnykh Zavedeniy, Fizika, No. 1, pp. 103-104, 1962)
Unclassified report

DESCRIPTORS: *Electric discharges, *Electric fields, Electrodes, Air, Color film, Pressure, Voltage, Translations, Sulfur, Iron, USSR, Photographic plates.

With a decrease in the air pressure the streamer channels of the klydonograms unbend and thicken, while the conditions of development of a discharge at electrodes of different polarities, judging by the picture on the photoemulsion, are at first equalized and then become somewhat more favorable at the negative electrode. At pressures below 50 mm Hg klydonograms of interacting electrodes assume the form of thickened luminous columns elongated along the line joining the electrodes. The klydonograms obtained at reduced pressures on color film are more blurred. Original color phenomena occur on klydonograms in the case of a discharge on film through powder. The results described are useful for understanding the development of small-scale electrical discharges. (Author)

AD-295 785 Div. 7, 25
(TISTE/OHD) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A METHOD FOR PROBE STUDIES OF A D-C CORONA FIELD USING AN OSCILLOGRAPH,
by V. I. Levitov, A. G. Lyapin and others. 3 Jan 63, 16p. incl. illus. 4 refs. (Trans. no. FTD-TT-62-1530 from Izvestiya Akademii Nauk SSSR, OTN Energetika i Avtomatika, No. 2, pp.47-54, 1962)
Unclassified report

DESCRIPTORS: *Electrical corona, *Oscillographs, Oscilloscope probes, Voltage, Waveform generators, Cams, Electric switches, Electrostatic capacitance, Translations, USSR, Measurement, Electric fields.

A procedure for probe measurements using an oscillograph is examined. A result of probe measurements at a given point of an electrical field of d-c corona is the volt-ampere characteristic of the probe, which makes it possible to determine the potential of the field U (by the point of intersection of the extension of the linear part of the characteristic with the voltage axis) and the product of the ionic mobility and the space-charge density k (by the slope of the linear part of the characteristic and the capacitance of the probe). It is desirable to seek a method of measurement in which it is not necessary to know the capacitance of the probe to determine k. The use of an oscillograph for measurements allows this problem to be solved, and also the capacitance of the probe to be determined experimentally. (Author)

AD-295 802 Div. 7
(TISTE/OHD) OTS price $8.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NEWS OF SCHOOLS OF HIGHER EDUCATION, ELECTROMECHANICS (SELECTED ARTICLES),
31 Jan 63, 79p. incl. illus. table, refs. (Trans. no. FTD-TT-62-1556 from Izvestiya Vysshykh Uchebnykh Zavedeniy, Elektormekhanika, No. 2, pp. 140-154, 155-167, 177-188, 189-195, 1962)
Unclassified report

DESCRIPTORS: *Electromechanical converters, *Electric motors, *Generators, *Electric machinery, Translations, Pulse generators, Mathematical analysis, Design, Transients, Simulation, Magnetic fields, Magnetic cores, Armatures, Motor generators, USSR.

AD-295 811 Div. 7
(TISTE/OHD) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SPECIAL RECTIFIERS,
by V. G. Ulitin. 21 Jan 63, 3p. (Trans. no. FTD-TT-62-1646 from Byulleten' Tekhniko-Ekonomicheskoy Informatsii, No. 3, pp. 23-24, 1962)
Unclassified report

DESCRIPTORS: *Rectifiers, Selenium rectifiers, Welding, Voltage regulators, USSR.

AD-295 907 Div. 7
(TISTM/EJH) OTS price $2.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
HIGH-TEMPERATURE VAPOR-FILLED THERMIONIC CONVERTER.
Quarterly technical progress rept., 1 Oct-31 Dec 62,
by W. Godsin. 7 Jan 63, 21p. incl. illus. table (Rept. no. GA-3798)
(Contract AF 33(657)8563, Proj. 8173)
Unclassified report

DESCRIPTORS: *Power supplies, *Thermionic emission, Manufacturing methods, Filaments, Failure (Mechanics), Materials, Molybdenum, Aluminum compounds, Oxides, Tantalum, Carbides, Uranium compounds, Zirconium compounds, Cesium, Vapors, Tests, Thermocouples.

Cell F was operated at power for 484 hours. Cell F is the first cell in which the expected current emission density was observed from a carbide emitter in an engineered thermionic generator. Short-circuit currents of 120 amp were observed from the emitter in the cell. A maximum power output of 50 watts (5 w/sq cm) was obtained at an emitter temperature of 2440 K. During steady state operation power was in the

range from 10 to 30 watts. The cell was not optimized for maximum power. The contact potential in the cell agrees with that expected from a low work function carbide emitter and a fully cesiated collector. For a nominal contact potential of 1 volt and a short-circuit current of 120 amp, the optimum power should have been 120 watts, assuming no transport defects in the cell. Actually the maximum power output corresponding to a short-circuit current of 120 amp was more nearly 40 watts, indicating transport defects in the cell. (Author)

AD-295 917 Div. 7, 25
(TISTM/SJR) OTS price $3.50

Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
ADVANCED SOLAR THERMIONIC POWER SYSTEMS.
Final rept. June 60-Aug 62.
Dec 62, 239p. incl. illus. tables (Rept. no. ER-5038)
(Contract AF 33(616)7411, Proj. 8173)
(ASD TDR 62-877) Unclassified report

DESCRIPTORS: *Thermionic emission, *Power supplies, *Solar cells, Generators, Vacuum systems, Thermoelectricity, Effectiveness, Cesium, Vapors, Storage batteries, Cadmium, Nickel, Silver, Plasma physics, Solar energy, Design.

A survey of all components required for advanced solar thermionic power systems in the 1-10 kw range suitable for application in aerospace vehicles is presented. The results of the survey and development program were used to determine design criteria applicable to these systems. The development program included evaluation of thermionic converters of the vacuum and vapor type. The details of the design, fabrication, performance tests, and evaluation of the thermionic converters and generators built during the program are presented. The importance of the proper selection of solar receiver configuration, as well as the requirement for high precision solar concentrators, is treated extensively. Consideration is also given to the requirements of the orientation subsystem, energy storage subsystem and the many control requirements necessary to adequately orient the solar concentrator arrays, store energy for the shade portion of the orbital cycle and properly condition the electrical power required by the vehicle load. The Appendix presents a detailed design, performance, and test specification for a 1.5 kw, 28 volts solar thermionic power system. (Author)

AD-295 976 Div. 7
(TISTM/SJR) OTS price $5.60

Union Carbide Consumer Products Co., Cleveland, Ohio.
ALKALINE-MnO2 BATTERY.
Quarterly rept. no. 1, 1 May-30 July 62, by J. Winger. 27 Aug 62, 47p. incl. illus. tables.
(Contract DA 36-039-sc-89098, Proj. 3A99-09-002-02)
Unclassified report

DESCRIPTORS: *Primary batteries, *Wet cells, *Electrolytic cells, Electrolytes, Potassium compounds, Hydroxides, Manganese dioxide electrodes, Battery separators, Anodes (Electrolytic cells), Zinc electrodes, Polarization, Cathodes (Electrolytic cells), Storage, Deterioration, Graphite, Vinyl chlorides, Polymers, Low temperature research, Design, Effectiveness.

The initial effort to analyze the present factory product E-95 (D size) Alkaline-MnO2 round cell with special emphasis placed on location of problem areas affecting low temperature, heavy drain service. Empirical data was obtained from variations of electrode and electrolyte formulations as well as separator materials. An optimized cell was obtained for use in factory trials. This cell contains a cathode with a 4/1 ore to carbon ratio, an electrolyte with 40% KOH as dispensed into the cell (approximately 32% equilibrium value in the anolyte), a Viskon-Vinyon separator and a powdered zinc anode. The work to date has indicated a need for a higher surface area zinc. Uniformity of cathode mix formulations will also be characterized with respect to solution volumes, packing, density, etc. (Author)

AD-295 983 Div. 7
(TISTM/SJR) OTS price $4.60

Eagle-Picher Co., Joplin, Mo.
RESEARCH ON AMMONIA BATTERY SYSTEM.
Quarterly progress rept. no. 1, 1 July-30 Sep 62, by D. J. Doan and L. R. Wood. 30 Oct 62, 34p. incl. illus. tables (Rept. no. 9)
(Contract DA 36-039-sc-89188, Proj. 3A99-09-001; Continuation of Contract DA 36-039-sc-85396)
Unclassified report

DESCRIPTORS: *Primary batteries, *Electrolytic cells, *Ammonia, *Wet cells, *Power supplies, *Electrolytes, Silver compounds, Sulfates, Battery separators, Anodes (Electrolytic cell), Hydrogen, Chlorides, Mercury compounds, Magnesium compounds, Thiocyanates, Perchlorates, Potassium compounds, Electric discharges, Impedance, Effectiveness, Liquefied gases, Cathodes (Electrolytic cell), Design, Chemical properties.

A better understanding has been obtained of the factors contributing to the previously observed slower practical activation of the -53 C batteries as compared to single cells under ideal conditions. Tests indicate a larger percentage of the batteries activate in less than 3 seconds, with several about 1 second. A new high-rate cathode possibility (silver sulfate) has been found. Permion 300 separator has been found much better than cellophane for limiting the silver diffusion in the low-rate, long duration application. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-294 922 Div. 8
(TISTP/FR) OTS price $7.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
AUTOCORRELATION OF PULSE POSITION MODULATED SIGNALS
Master's thesis,
by Nicholas G. Gionis. Dec 62, 65p. incl. illus. tables, 10 refs. (Rept. no. GE/EE/62-7)
Unclassified report

DESCRIPTORS: *Pulse modulation, *Correlation techniques, Pulse generators, Noise generators, Modulators, Solid delay lines, Functions, Instrumentation.

One method of evaluating a communication receiver is by its ability to accurately discriminate desired information signals from combined signal-plus-noise. A device (autocorrelator) is discussed which was designed to operate with decreased signal to noise ratios. A generator for a particular type of information

carrier, pulse position modulation, was constructed, and an appropriate noise source was used. The combined signal plus noise was sent through the autocorrelator, and a comparison of signal to noise ratios with and without correlation was made in order to ascertain the effectiveness of the device in performing its function. (Author)

AD-294 926 Div. 8
(TISTE/CAM) OTS price $14.50

Radio Corp. of America, Harrison, N. J.
THE DESIGN AND DEVELOPMENT OF A ONE-HALF WATT HEATER POWER REDUCED SIZE NUVISTOR TRIODE.
Final development rept., 27 June 60-15 Nov 62,
by R. K. Reusch and W. J. Helwig. 15 Nov 62, 210p. incl. illus. tables, 15 refs.
(Contract NObsr-81478, Proj. SR0080302)
Unclassified report

DESCRIPTORS: *Triodes, Radio interference, Noise (Radio), Microwave amplifiers, Microwave oscillators, Mechanical properties, Electrical properties, Anodes (Electron tubes), Cathodes (Electron tubes), Aging, Temperature, Voltage, Life expectancy, Tables, Miniature electron tubes, Subminiature electron tubes, Electron tube heaters, Design.

Presented is the design and development of two reduced size nuvistors having one-half watt heaters. Both types were designed with the aid of a computer. The A15274 has a transconductance of 12.0 millimhos at 7 milliamperes of plate current. It operates as a grounded grid amplifier at 500 mc with a noise factor of 5.9 db. and can sustain oscillation at frequencies up to at least 2 gc. The A15330 has a transconductance of 10.0 millimhos at 7.9 milliamperes of plate current and can tolerate about 130 millivolts of undesired signal at its grid before 4% cross modulation is exceeded. At 500 mc the noise factor in grounded grid configuration is about 6.0 db. (Author)

AD-294 937 Div. 8, 26
(TISTE/OHD) OTS price $8.10

Photocircuits Corp., Glen Cove, N. Y.
PRODUCTION ENGINEERING MEASURE FOR MULTILAYER PRINTED WIRING BOARD.
Quarterly rept. no. 1, 1 July-30 Sep 62,
by G. Messner, R. McGaw, and W. Baldwin.
30 Sep 62, 81p. incl. illus. tables.
(Contract DA 36-039-sc-86745)
Unclassified report

DESCRIPTORS: *Printed circuits, *Manufacturing methods, Sandwich construction, Subminiature electronic equipment, Processing, Photoengraving, Soldering, Production.

The processes required for manufacture of miniaturized layered printed wiring according to specification were evaluated and a tentative process sequence selected on the basis of production efficiency or contribution to the reliability of the manufactured part. The selected steps have also been tried to insure their adaptability for a high production rate. Artwork and tooling needed for the production of preliminary engineering samples were completed. Tentative specifications for qualification testing of the incoming thin copperclad epoxy fiberglass base laminates were prepared, and numerous samples of such materials from various vendors were tested according to the requirements of this specification. (Author)

AD-294 944 Div. 8
(TISTE/CAM) OTS price $1.60

Microwave Associates, Inc., Burlington, Mass.
DISTRIBUTED JUNCTION TUNNEL DIODE OSCILLATOR.
Quarterly progress rept. no. 1, 1 May-1 Aug 62 on Phase 2,
by Charles Howell. 1 Aug 62, 14p. illus.
(Contract DA 36-039-sc-89163, Proj. 3A99-21-001)
Unclassified report

DESCRIPTORS: *Diodes, *Microwave oscillators, Oscillator circuits, Superhigh frequency, Feasibility studies, Chemical impurities, Packaging, Theory, Effectiveness, Impedance, Processing, Negative resistance circuits, S band, X band, Gallium compounds, Arsenides, Oscillators.

Efforts to determine the feasibility of constructing 10 mw 10 kmc tunnel diode oscillators were continued and diode requirements for these oscillators were determined. Various materials, doping elements, and fabrication techniques were investigated to determine the best combination of these to potentially meet the frequency and power requirements. Two packaged diode and two distributed diode oscillators were built. The packaged spot diode oscillators were operated at 10 kmc. Experience gained from using the spot diodes was useful in improving the distributed junction diode oscillators. Fabrication of distributed junction diodes was continued. (Author)

AD-294 945 Div. 8, 25
(TISTP/JW) OTS price $5.60

Microwave Associates, Inc., Burlington, Mass.
INVESTIGATION OF HIGH POWER GASEOUS ELECTRONICS.
Final progress rept., 1 Jan-15 Nov 62,
by Harold S. Maddix and Charles S. Ward.
15 Nov 62, 1v. incl. illus. tables, 11 refs.
(Contract DA 36-039-sc-89161)
Unclassified report

DESCRIPTORS: *Discharge tubes, *Electronic switches, Electric discharges, Argon, Chlorine, Temperature, Degasification, Adsorption, Plasma physics, Gas ionization, Quartz, Gas discharges, Radar duplexers.

Argon and chlorine gas cleanup and recovery in quartz vials due to the action of a microwave discharge is discussed in terms of the experimental results. The rate of gas cleanup is constant over a 3.0 gc to 9.5 gc frequency range. Cleanup is approximately independent of temperature over a -100 to +600 C range whereas spontaneous thermal recovery rates are proportional to temperature. The cleanup phenomena are explained on the basis of a surface deformation-annealing sequence. (Author)

AD-294 954 Div. 8, 30
(TISTP/TL) OTS price $11.50

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
DETERMINATION OF THE OPTIMUM DRIVING FUNCTION FOR THE LINEAR CONTROLLER OF A RELAY SERVO LOOP EMPLOYING STATE SPACE TECHNIQUES.
Master's thesis,
by William Bernard Goggins, Jr. Dec 62, 148p. incl. illus. tables, 11 refs. (Rept. no. GE/EE/62-8)
Unclassified report

DESCRIPTORS: *Control systems, *Linear systems, *Digital computers, *Servomechanisms, *Analog computers, Differential equations,

Synthesis, Time, Functional analysis, Computer logic, Vector analysis, Integral equations, Automatic, Errors, Programming, Matrix algebra, Simulation.

A way was developed to compute the time optimum driving function to be applied to a linear controller by the method of Steepest Descent. The method of Ho and Brentani was applied to the linear controller of a practical relay servo loop in order to compute the time optimum driving function for this loop. The relay servo loop was also simulated on an analogue computer; the results of simulation were compared with the time optimum driving function. It was found that the two results correlated well. (Author)

AD-294 960 Div. 8, 7
(TISTE/CAM) OTS price $3.60

Colorado U., Boulder.
IMPEDANCE OF A MONOPOLE ANTENNA WITH A RADIAL-WIRE GROUND SYSTEM ON AN IMPERFECTLY CONDUCTING GROUND.
Scientific rept. no. 4, Jan-Dec 61,
by C. T. A. Johnk, S. W. Maley and R. J. King.
24 Aug 62, 1v. incl. illus. refs.
(Contract AF 19(604)4556, Proj. 5635)
(AFCRL 62-745) Unclassified report

DESCRIPTORS: *Dipole antennas, Electrical conductance, Impedance, Measurement, Test equipment, Tables, Antennas.

A vertical monopole antenna system was constructed in the laboratory using water as an imperfectly conducting ground. The water was contained in a tank of sufficient extent and depth to very closely approximate an infinite half-space. Impedance measurements were made for a quarter wavelength monopole, first with a circular conducting disk ground system and then with radial wire ground systems of various radii and number of wires. The frequencies used were 4.2 and 9.6 kmc. As the number of radial wires in the ground system is increased, the impedance of the monopole approached that of a conducting disk ground system of equal radius. The impedance as a function of the number of radial wires is plotted on the same charts with calculated impedance values. (Author)

AD-295 005 Div. 8
(TISTE/CAM) OTS price $3.60

Watkins-Johnson Co., Palo Alto, Calif.
APPLIED RESEARCH ON A HIGH-POWER MILLIMETER-WAVE GENERATOR.
Interim engineering rept. no. 6, 1 Sep-30 Nov 62,
by James W. Sedin. 30 Nov 62, 27p. incl. illus. tables, 2 refs.
(Contract AF 33(616)8369)
Unclassified report

DESCRIPTORS: *Radiofrequency generators, *Backward wave oscillators, *Electron tubes, Microwave networks, Extremely high frequency, Voltage, Electron guns, Waveguides, Radiofrequency attenuators, Electroforming, Electron beams, Space charges, Theory, Focusing, Silicon compounds, Carbides, Radiofrequency power, Design.

A demonstration is given of the feasibility of generating very high power, specifically, 100 kw peak and 1000 watts average, at 100 kmc by means of an O-type backward-wave oscillator operating at very high voltage. The new electron gun, designated gun no. 435-1B, was completely tested and evolved, and a final design model has been constructed for experimental tube no. 2. Calculated and measured data for this gun design is presented. Further work was done on silicon carbide loaded glaze for use as a high power waveguide attenuator. A design was evolved and loads are being constructed. Minor difficulties were encountered in electroforming the circuits. A fixture for holding the waveguide and circuit mandrels in the proper orientation was constructed. A discussion of the difficulties encountered in attempting to use existing non-relativistic gun calculations for relativistic cases is presented. (Author)

AD-295 010 Div. 8
(TISTE/CAM) OTS price $2.60

Microwave Associates, Inc., Burlington, Mass.
SOLID STATE S- AND X-BAND LIMITERS.
Quarterly progress rept. no. 2, 30 June-30 Sep 62,
by Robert Tenenholtz. 30 Sep 62, 15p. illus.
(Contract NObsr-87307, Proj. SR 0080301)
Unclassified report

DESCRIPTORS: *Limiters, *Diodes, S band, X band, Experimental data, Electric shunts, Impedance, Reflection, Radiofrequency power, Tables, Theory, Semiconductors, Solid state physics.

Efforts in X-band were continued. In addition, work in the S- region was initiated. An analysis of several modes of limiter operation was made and a comparison of theoretical performance was performed. Experimental data for both X- and S-bands is presented showing present capabilities to be 500 and 1000 watts peak respectively. Types of diodes used are mentioned along with their operational characteristics. Spike leakage associated with high power type diodes used is described along with measured characteristics for both frequency regions of operation. (Author)

AD-295 011 Div. 8
(TISTE/CAM) OTS price $4.60

Radiation, Inc., Melbourne, Fla.
MULTIBAND TELEMETRY RECEIVER.
Quarterly rept. no. 2, 23 Oct-62 Jan 63,
by R. V. Murray. Jan 63, 1v. incl. illus.
(Contract N600(19)50925, Proj. 1653-01-4360)
Unclassified report

DESCRIPTORS: *Telemetering receivers, *Telemeter systems, *Communication equipment, Shipborne, Airborne, Packaged circuits, Detectors, Tuning devices, Electronic switches, Crystal oscillators, Radiofrequency oscillators, Plugs (Electricity), Video amplifiers, Power supplies, Radiofrequency amplifiers, Band-pass filters, Video filters, Mechanical properties, Electrical properties, Crystal mixers, Frequency stabilizers, Very high frequency, Ultra high frequency, Superhigh frequency, Solid state physics, Design, Packaging.

Design and development are described of a compact telemetry receiver for general purpose use at shore facilities and in ship and aircraft installations. The receiver will operate with standard telemetry signals in the 215-315 mc, 1435-1535 mc, 2200-2300 mc frequency bands and other frequency bands up to 10 kmc, as required. The receiver will be all solid-state, modular construction with interchangeable demodulators, plug-in heads and plug-in IF and video filters. (Author)

AD-295 024 Div. 8, 12, 32
(TISTE/OHD) OTS price $10.10

Autonetics, Downey, Calif.
ELECTRONIC EQUIPMENT VS. THE SPACE ENVIRONMENT.

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

A PARTIALLY ANNOTATED BIBLIOGRAPHY,
by H. W. Sowers. 15 Nov 62, 1v. refs. (Rept. no. EM-1162-145)
Unclassified report

DESCRIPTORS: *Bibliography, *Electronic equipment, *Space environmental conditions, Meteorites, Radiation effects, Temperature, Vacuum systems.

A bibliography is presented on the subject of the space environment and its effect on electronic equipment. Consisting of 357 references, the subject matter is broken down into the following categories: (A) Radiation effects; (B) Micrometeorites; (C) Temperature; (D) Vacuum; (E) General. Most of the references cover the years 1958-1962, although there are some cited which were published prior to 1958. The references are arranged alphabetically by source, report number, author, and date respectively. Author, corporate source and periodical, and subject indexes follow. (Author)

AD-295 030 Div. 8
(TISTM/EJH) OTS price $3.60

Lewis, E. B. Co., Inc., East Hartford, Conn.
PRODUCTION ENGINEERING MEASURES CRYSTAL UNIT CR-(XM-46)/U.
Quarterly rept. no. 1, 10 June-31 Oct 62,
by Robert P. McComb. 31 Oct 62, 15p. illus.
(Contract DA 36-039-sc-86737)
Unclassified report

DESCRIPTORS: *Quartz crystals, *Crystal filters, Electrodes, Silver, Aluminum, Production, Design.

Design data for AT Cut Quartz Crystals for filter applications operating on the third overtone at 30 MC/s is presented. An evaluation of forty-four crystal units with two electrode sizes and two mounting positions is given. A comparison of the electrical parameters between the crystals fabrication and the ultimate design goal is also given. (Author)

AD-295 057 Div. 8, 26
(TISTE/CRJ) OTS price $2.60

Sprague Electric Co., North Adams, Mass.
PRODUCTION ENGINEERING MEASURE RELIABILITY IMPROVEMENT JET ETCH TRANSISTOR.
Quarterly rept. no. 2, 31 July-31 Oct 62,
by R. N. Gagne, J. E. Krantz, and J. H. D. Folster. 31 Oct 62, 20p. incl. illus. table.
(Contract DA 36-039-sc-86721)
Unclassified report

DESCRIPTORS: *Transistors, *Manufacturing methods, Reliability, Chemical milling, Life expectancy, Processing, Electrical properties, Production, Transistors.

The optimum collector resistivity, the optimum collector thickness, the optimum electrical base-width, and the proper emitter placement were determined. Investigations leading to these determinations are described. Work has continued toward devising a method to stop automatically the delineation etching process after the collector junction was delineated. Some progress was made in this area, and work is continuing. Two new process steps were introduced and descriptions of these are also given. The status of the program, life test results to date, and current failure rates are also presented. (Author)

AD-295 074 Div. 8, 15
(TISTE/CRJ) OTS price $9.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
ON THE DESIGN OF LINEAR PROCESS ADAPTIVE CONTROL SYSTEMS,
by Harry Nathan Yagoda. 31 Aug 62, 121p. incl. illus. (Research rept. no. PIBMRI-1075-62)
(Contract AF 18(603)105 and Grant AFOSR 62-280)
Unclassified report

DESCRIPTORS: *Linear systems, *Control systems, Differential equations, Errors, Mathematical analysis, Functions, Feedback, Theory, Noise, Servo systems, Control.

The problem is presented of controlling a stable, slowly time varying, linear process. A solution is proposed that is simple, practical and applicable to any finite order process. Use is made of a continuously adjusted tandem compensator; a comparison of the weighted histories of the input and output signals is used to control this adjustment. System design is based upon the use of a variable transfer function characterization for both the compensator and the process. In effect, a compensator is designed that attempts to cancel the variable poles of the process with variable zeros, the variable zeros of the process with variable poles and the variable process gain with its reciprocal. The design technique developed is applied to several problems. The processes involved range from a variable gain amplifier through a plant that contains a variable gain and two pair of variable complex poles. The processes are grouped in accordance with the number of variable parameters in the process characterizing function. (Author)

AD-295 078 Div. 8
(TISTE/CAM) OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
AN ELECTROMECHANICAL METHOD OF SCANNING THE STRETCH ARRAY,
by J. L. Poirier. Sep 62, 15p. incl. illus.
(Rept. no. AFCRL-62-725)
(Proj. 4642)
Unclassified report

DESCRIPTORS: *Dipole antennas, *Coupled antennas, Transmission lines, Very high frequency, Ultra high frequency, Calibration, Control systems, Electronic relays, Electronic switches, Pulse generators, Electronic scanners, Servo systems.

A new type of antenna array consists of dipole elements, proximity coupled to a two-wire transmission line. Scanning is accomplished by changing the spacing between elements. A method of scanning using electromechanical methods is described which is particularly useful in large antenna systems over the frequency range of about 50 to 500 mc. (Author)

AD-295 093 Div. 8
(TISTE/CAM) OTS price $2.60

Westinghouse Electric Corp., Baltimore, Md.
RESEARCH ON MILLIMETER FERROMAGNETIC TYPE PARAMETRIC AMPLIFIER.
Quarterly progress rept. no. 3, 1 Aug-31 Oct 62,
by Robert A. Moore, Denis C. Webb and others.
Jan 63, 28p. incl. illus. tables (Rept. no. 7)
(Contract DA 36-039-sc-89071)
Unclassified report

DESCRIPTORS: *Parametric amplifiers, Waveguides, Microwaves, Dielectrics, K band,

Propagation, Magnetic fields, Paramagnetic resonance, Theory, Tables, Measurement, Electromagnetic waves, Resonance, Ferromagnetic materials.

Investigating techniques were continued for ferromagnetic parametric amplification in the millimeter-wave frequency region. Experimental correlation was obtained for the 8mm data. New data was obtained for 2 mm, H<Ho, and for 8 mm, H > Ho. A method for establishing an operating point is described. A rod size is shown which will support three appropriately chosen simultaneous electromagnetic resonances. Work has begun on the dielectric rod structure as a means of treating the more difficult case of the ferrite rod. Similar feeds are required for analogous modes. Analysis of the dispersive properties is much simpler and is available from a number of previous studies. An operating point is chosen from a knowledge of the dispersive behavior of the dielectric rod. The magnetodynamic mode chart is completed. Charting over a wide frequency range has permitted close correlation with the theoretical Walker mode spectrum at low frequencies and good agreement with predicted modes of the dielectric sphere resonator at high frequencies. (Author)

AD-295 096 Div. 8, 5
(TISTP/WH) OTS price $10.50

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
INVESTIGATION AND ANALOG SIMULATION OF THE TYPE TWO AND TYPE THREE PHASE-LOCK LOOP.
Master's thesis,
by Edgar F. Thomas. Dec 62, 127p. incl. illus. 19 refs. (Rept. no. GE/EE/62-20)
Unclassified report

DESCRIPTORS: *Frequency stabilizers, *Analog computers, *Digital computers, *Phase detectors, Simulation, Electronic equipment, Programming, Radio signals.

The result of an investigation and simulation of a type two and type three phase-lock loop is presented. Standard root locus analysis and analog computer simulation were both accomplished, and the results compared. Step, ramp, and parabolic inputs were tested separately and in a random sequence to obtain the response of the phase-lock loop. This report demonstrates that it is possible to operate the phase-lock loop in type two and type three configuration with large variations in the basic frequency. Recommendations for further study and physical realization are made. (Author)

AD-295 110 Div. 8
(TISTE/CAM) OTS price $2.60

Airborne Instruments Lab., Inc., Deer Park, N. Y.
LOW-NOISE SMALL-SIGNAL AMPLIFIER.
Interim rept. no. 1, 1 July-25 Oct 62,
by D. Neuf and P. Lombardo. 15 Jan 63, 25p. incl. illus. tables, 2 refs.
(Contract NObsr-87556)
Unclassified report

DESCRIPTORS: *Diodes, *Parametric amplifiers, *Variable capacitors, Broadband, S band, Ultra high frequency, Superhigh frequency, Tuning circuits, Electronic circuits, Noise (Radio), Reduction, Cooling, Voltage, Electrostatic capacitance, Semiconductors, Model tests.

Parametric amplification is achieved by the use of a semiconductor P-N junction (varactor) that functions as a voltage variable capacitor. The varactor receives two voltages--one at a signal frequency and the other at a much higher frequency (pump frequency). An evaluation is presented of two configurations of difference-frequency parametric amplifiers. The first breadboard models of both types of amplifiers are shown and practical data is presented. A recently published technique for broad-banding parametric amplifiers by means of two pumps is also evaluated. (Author)

AD-295 129 Div. 8
(TISTE/OHD) OTS price $5.60

Sperry Gyroscope Co., Great Neck, N. Y.
BEAM-TYPE PARAMETRIC AMPLIFIER.
Final technical rept., 19 Jan 61-19 Oct 62,
by R. Eng, I. Itzkan, and A. S. Ferello. Nov 62, 53p. incl. illus. 12 refs. (Rept. no. NA-8210-8333)
(Contract AF 30(602)2433, Proj. 5573)
(RADC TDR 62-597) Unclassified report

DESCRIPTORS: *Parametric amplifiers, *Microwave amplifiers, Electron beams, X band, K band, Broadband, Noise (Radio), Coupling circuits, Mathematical analysis, Helixes, Wave transmission, Propagation, Radiofrequency oscillations, Magnetic fields, Waveguides, Design, Electron beams.

The objectives of the program are to demonstrate the feasibility of two beam-type parametric amplifiers; one capable of narrowband voltage-tuned operation, and the other capable of broadband untuned operation. The report covers the theoretical and experimental studies of the characteristics of the fast cyclotron wave, coupler and pump circuits for the coupling and amplification of the cyclotron wave. Cold test data show that a chosen coupler is capable of operating over a 25% bandwidth, provided a modification of the coupler interaction impedance is made. A Kompfner dip as high as 28 db was observed in an experimental setup. An electronic gain of approximately 10 db was obtained with a resonant pump operated at about 8 watts. The electron gun is a convergent-flow Pierce type. The effect of the magnetic flux threading the cathode is discussed. Voltage-tuned operations are discussed, and a design for an X-band, fixed-tuned, broadband degenerate device is given. (Author)

AD-295 139 Div. 8
(TISTE/CAM) OTS price $2.60

General Electric Co., Auburn, N. Y.
THE RESEARCH AND DEVELOPMENT OF HIGH CURRENT AND HIGH VOLTAGE SILICON CONTROLLED RECTIFIERS.
Quarterly progress rept. no. 2, 1 Oct-31 Dec 62. 31 Dec 62, 1v. incl. illus.
(Contract NObsr-87648, Proj. SF-013-11-05)
Unclassified report

DESCRIPTORS: *Rectifiers, *Electronic switches, *Semiconductors, Silicon, Processing, Voltage, Electric currents, Programming, Surfaces, Chemical impurities, Theory, Design.

Effort was continued on the research and development of high-current and high-voltage, silicon controlled rectifiers. Junction assembly components were designed, procured and used for the initial (state-of-the-art) design samples. The initial geometry and contour of the junction structure was modified as information was obtained during optimization of design parameters. No change in components was necessary, but some modifications to the original fixtures, tools and jigs were made as a result of the device changes. Samples were prepared representing the state-of-the-art at this time. (Author)

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-295 153 Div. 8, 26
(TISTE/CRJ) OTS price $1.60

Microwave Associates, Inc., Burlington, Mass.
VARACTOR DIODE INDUSTRIAL PREPAREDNESS MEASURES.
Quarterly progress rept. no. 10, 25 Sep-25 Dec 62.
25 Dec 62, 6p. illus.
(Contract DA 36-039-sc-85941)
Unclassified report

DESCRIPTORS: *Diodes, *Semiconductors, *Manufacturing methods, Variable capacitors, Silicon, Electrostatic capacitance, Test methods, Resistance, Measurement, Production, Industrial production.

A method of measuring the series resistance of a glass Type III varactor diode is presented. The measurement is based on a determination of the transmission loss due to inserting a diode in a shunt with a transmission line. The transmission loss, maximized by series tuning of the diode, is converted to series resistance in ohms through use of a conversion graph. (Author)

AD-295 174 Div. 8, 19
(TISTE/CAM) OTS price $5.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
AN ANALYSIS OF THE UNIPOLAR TRANSISTOR AS A CHOPPER AMPLIFIER.
Master's thesis,
by James Ray Wolverton. Dec 62, 51p. incl. illus. tables, 25 refs. (Rept. no. GE/EE/62-21)
Unclassified report

DESCRIPTORS: *Transistor amplifiers, *Star trackers, *Celestial navigation, Theory, Electronic equipment, Optical equipment, Electronic circuits, Servo motors, Power amplifiers, Photoelectric cells, Test equipment, Test methods, Analysis, Solid state physics, Transistors.

Absolute sensitivity requirements and system functions are developed for a system capable of tracking a second magnitude star. Space-compatability is defined. The problems of star acquisition and position readout are analyzed. Available photovoltaic devices, unipolar field effect transistors, servo motors, and servo power amplifiers are discussed. A method of electronic chopping using the unipolar transistor is devised. A complete star tracking system is synthesized and the method of testing and test conditions described. Results of the generally satisfactory testing are given together with recommendations for future development. (Author)

AD-295 180 Div. 8
(TISTE/CAM) OTS price $2.60

Airborne Instruments Lab., Deer Park, N. Y.
DEVELOPMENT OF TUNABLE KU-BAND REACTANCE AMPLIFIER.
Quarterly progress rept. no. 1, 1 July-30 Sep 62,
by J. Whelehan. 30 Sep 62, 22p. incl. illus. table, 4 refs.
(Contract DA 36-039-sc-90779, Proj. 3A99-21-002)
Unclassified report

DESCRIPTORS: *Diodes, *Parametric amplifiers, Klystrons, Tuning devices, Tuning circuits, Noise (Radio), Radiofrequency power, Sidebands, Mathematical analysis, Impedance, Electrical properties, High frequency, K band, Silicon, Gallium compounds, Arsenides.

The characteristics of the varactor needed for this system were studied in conjunction with the development of a technique for determining the figure of merit of the diode. Various amplifier configurations were considered and the effects of pump power and pump frequency variations on the gain and phase stability of the amplifier were investigated. (Author)

AD-295 412 Div. 8, 26
(TISTE/CAM) OTS price $13.00

Delco Radio Div., General Motors Corp., Kokomo, Ind.
PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION TECHNIQUES AND INCREASE THE RELIABILITY OF THE 2N1358A TRANSISTOR.
Quarterly progress rept. no. 2, 30 July-30 Oct 62,
by J. C. Kuhns. 30 Oct 62, 187p. incl. illus. tables, 41 refs.
(Contract DA 36-039-sc-86725)
Unclassifed report

DESCRIPTORS: *Transistors, *Manufacturing methods, Semiconductors, Diodes, Crystals, Germanium, Growth, Chemical milling, Processng, Soldering, Reliability, Failure (Mechanics), Surfaces, Aging, Gases, Analysis, Contamination, Spectrographic analysis, Microanalysis, Infrared spectrophotometers, X-ray diffraction analysis, Tables, Production.

Effort was continued to improve the reliability of the 2N1358A transistor by specific improvements of manufacturing techniques. The plan includes equipment and process modifications, a reliability test program, a failure analysis program, and an analytical-empirical surface study program. Planned equipment and process modifications, are in effect and being used as standard production. Effort was directed toward solving the particular causes of reliability type failures. Detailed reports of this work are included. Information from the reliability testing program was accumulated and analyzed. The Milestone I test completed 1000 hours on test and the results are tabulated and included. Relationships between the daily manufacturing tests, acccelerated life tests, and special step-stress tests are being developed. The failure analysis program has continued to yield information as to the nature of failures and provides a quantitative measurement of the various failure modes. In the analytical-empirical surface study program, numerous experiments have been run and analyzed. (Author)

AD-295 445 Div. 8
(TISTW/JEA) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AN ION SOURCE WHICH GENERATES IONS THROUGH IMPACT IONIZATION OF GAS MOLECULES,
by N. S. Zinchenko. 15 Jan 63, 5p. incl. illus.
(Trans. no. FTD-TT-62-758 from Russian Patent No. 140918 (670444/26) 20 June 1960)
Unclassified report

DESCRIPTORS: *Ion sources, *Collecting methods, Electron beams, Electron guns, Electric fields, Ion accelerators, Ion beams, Diaphragms (Mechanics), USSR, Focusing, Electrons, Ionization potential, Gas ionization, Ions.

An ion source generating ions by impact ionization of gas molecules is based on ionic focusing of the electron beam under a high vacuum. It contains an electron gun, an accelerating diaphragm, an electron and an ion collector. It differs by obtaining under a high vacuum without a magnetic field an intense ion current,

which is focused by an electron beam pointed in the same direction. The ion collector is used for the purpose of effecting the necessary separation of ion and electron beams. The ion collector, which is at negative potential, is located behind the electron collector, and it also acts as an electrode to draw off the ions. (Author)

AD-295 448 Div. 8
(TISTW/JEA) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A REVERSIBLE DECIMAL COUNTER,
by I. M. Beskrovnyy. 10 Jan 63, 4p. incl. illus. (Trans. no. FTD-TT-62-1438 from Russian Patent No. 133684 (660467/26), 28 Mar 1960)
Unclassified report

DESCRIPTORS: *Pulse counters, *Time interval counters, Pulse generators, Triggered gates, Inverter circuits, Pulse transformers, Feedback, USSR, Pulse amplifiers, Trigger circuits, Multipath transmission.

Decimal counters consisting of series-connected binary counters and reversible binary counters are known. A drawback to these known devices is the fact that additional feedback is used in them for reversing, which complicates the device as a whole. In the device described here this drawback is eliminated by adding two channels to the decimal counter, which consists of four flip-flops with a pair of output channels. The connections between counter cells are made so that there is no need for additional feedback. (Author)

AD-295 449 Div. 8
(TISTW/RD) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A DIRECT CURRENT TRANSFORMER,
by L. F. Sobeshchanskiy, M. V. Vlasov and others. 9 Jan 63, 4p. incl. illus. (Trans. no. FTD-TT-62-117-from Soviet Patent No. 129677 (640031/24) 30 Sep 59)
Unclassified report

DESCRIPTORS: *Transformers, USSR, Semiconductors, Power transformers, Triodes, Feedback, Direct current.

A direct current transformer is described. It belongs to the semiconductor type containing a master oscillator and a power transformer to which the load is applied. A feature of the transformer is the excitation of a given oscillator by an auxiliary transformer with an inductive feedback, the primary winding of which is connected in parallel with the primary winding of the power transformer to two junction-type triodes mounted according to the schematic with a common control electrode. (Author)

AD-295 456 Div. 8, 25
(TISTW/JEA) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A METHOD FOR THE DIRECT TRANSFORMATION OF HEAT ENERGY INTO ELECTRICAL ENERGY,
by I. K. Vul'fel'dt. 9 Jan 63, 4p. incl. illus. (Trans. no. FTD-TT-62-759 from Soviet Patent No. 140920 (689180/24) 16 Dec 60)
Unclassified report

DESCRIPTORS: *Thermoelectricity, *Energy, Thermocouples, Dielectric properties, Capacitors, Reliability, USSR, Transformations, Frequency, Resonance, Heat transfer, Electric potential.

A method is proposed which excludes the necessity for initial capacitor activation in the sources and enables the efficiency and functional reliability of the energy converter to be raised and its weight, dimensions, and inertia to be lowered. This is attained by connecting a capacitor together with a linear inductance into a circuit operating at parametric resonance at a frequency half of that at which the dielectric heats. The essence of the method consists in alternately heating and cooling the capacitor, the dielectric of which possesses a penetrability which is a function of temperature. As a result of a change in the capacitance of the capacitor a variable electric current is excited in the circuit. (Author)

AD-295 502 Div. 8, 26, 30, 5
(TISTA/VGW) OTS price $2.60

CBS Labs., Stamford, Conn.
A LARGE DIAMETER X-RAY SENSITIVE CAMERA TUBE. Final rept.,
by R. Rutherford, Jr. 1 Oct 62, 22p. incl. illus.
(Contract DA 19-020-ORD-5515)
(WAL TR 142/68) Unclassified report

DESCRIPTORS: *Camera tubes, *Non-destructive testing, *Photoelectric cells, Selenium, Photoconductivity, Vacuum seals, Tests, Aluminum, Beryllium, Television communication systems, X-rays, Instrumentation, Design.

The design and fabrication of several developmental, large-diameter (nine-inch), x-ray sensitive camera tubes of the photoconductive selenium surface type are described with preliminary operational results. Aluminum and beryllium window tubes were successfully made using an epoxy cold seal technique with continuously operating gettering pumps. (Author)

AD-295 555 Div. 8
(TISTE/OHD) OTS price $5.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
THE RESPONSE OF AN AUTOMATIC PHASE CONTROL SYSTEM TO FM SIGNALS AND NOISE,
by Donald L. Schilling. June 62, 136p. incl. illus. tables, refs. (Research rept. no. PIBMRI-1040-62)
(Contract AF 18(600)1505; Grant AFOSR 62-295)
Unclassified report

DESCRIPTORS: *Control systems, *Phase shifters, *Servo systems, Frequency modulation, Noise (Radio), Perturbation theory, Nonlinear differential equations, Narrowband, Signal-to-noise ratio, Damping, Radiofrequency filters, Mathematical analysis, Transistors, Experimental data, Theses, Phase detectors.

An automatic phase control system is analyzed to determine its response to frequency modulated signals and narrowband Gaussian noise. Emphasis is placed on the system's response to frequency ramp modulated signals. In contradistinction to previous analyses, the assumptions of a linearized system and of a S/N ratio greater than unity were not made. The response of the System to an FM signal is obtained using a perturbation technique and perturbing about the solution to the nonlinear pendulum problem. A piecewise-linear solution is also presented and used to extend the class of solutions obtainable when using the perturbation technique. The piecewise-linear technique does not result in as good an approximation, but it can be used when the system is critically-damped, or overdamped. The response of the automatic phase

control system to narrow-band Gaussian noise is next obtained. An iteration technique is used and convergence is proven. The response of an automatic phase control system to FM signals embedded in noise is discussed. (Author)

AD-295 573 Div. 8, 25, 6
(TISTP/JW) OTS price $4.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
A QUANTITATIVE EXAMINATION OF THE RADAR RESOLUTION PROBLEM,
by J. L. Allen. 17 Sep 62, 41p. incl. illus. 27 refs. (Technical rept. no. 281)
(Contract AF 19(628)500)
(AFESD TDR 62-269) Unclassified report

DESCRIPTORS: *Radar, *Radar signals, Functions, Signals, Sensitivity, Amplitude modulation, Quantitative analysis, Distortion.

The ability of a radar to resolve overlapping signals is examined. It is shown that the primary limitation on resolvability is the unpredictable difference between the actual received signal and the waveform for which the target receiver is matched (the distortion in the received signal). The effects of signal distortion on the shape of the 'ambiguity function' are examined, based upon a wideband random process model for the distortion. The statistics of the ambiguity function side-lobe region, in the presence of the distortion, are related in a simple manner to the statistics of the distortion process. The optimum two-target resolver for the distorted signal is then derived and its performance is examined for two different conditions of a priori knowledge concerning the signal: all parameters of both target returns known exactly, with only the presence or absence of the second target uncertain, and the phase and amplitude of either or both returns unknown, but all other parameters exactly known. These two cases make evident the comparative seriousness of wide-band distortion and lack of a priori knowledge. Probability of detection vs probability of false-alarm curves are derived for both cases. (Author)

AD-295 578 Div. 8, 26
(TISTM/RGR) OTS price $5.60

General Electric Co., Schenectady, N. Y.
SILICON PLANAR EPITAXIAL TRANSISTOR TYPE 2N2193.
Quarterly rept. no. 2, 31 July-31 Oct 62 on Production Engineering Measure.
31 Oct 62, 1v. incl. illus. tables.
(Contract DA 36-039-sc-86727)
Unclassified report

DESCRIPTORS: *Transistors, Silicon, Manufacturing methods, Processing, Alloys, Evaporation, Heating, Vacuum apparatus, Phosphorus, Semiconductors, Temperature, Reliability, Diffusion, Boron compounds, Oxides, Chlorides, Gases, Production.

This report includes:
SILICON GROWN DIFFUSED TRANSISTOR 2N336.
Quarterly rept. no. 2, 31 July-31 Oct 62 on Production Engineering Measure,
by P. W. Olaki.
(Contract DA 36-039-sc-86727)

AD-295 579 Div. 8, 2, 12
(TISTE/CRJ) OTS price $1.60

Harvard Coll. Observatory, Cambridge, Mass.
A Z-MODE SPACE RADIO PROGRAM,
by M. D. Papagiannis and G. R. Huguenin. Aug 62, 16p. incl. illus. tables (Scientific rept. no. 4)
(Contract AF 19(604)6120, Proj. 8605)
(AFCRL 62-1059) Unclassified report

DESCRIPTORS: *Radio astronomy, *Satellite vehicles, *Orbital flight paths, Sun, Extraterrestrial radio waves, Propagation, Magnetic fields, Mathematical analysis, Terrestrial magnetism, Space flight, Determination.

The directivity offered by the Z-mode can be very advantageous in making radio astronomical observations of high resolution. The positions are calculated of a 1000 km circular orbit satellite in terms of the universal time and the day of the year, from which it can see radiation from the Sun propagating through the Z-mode. (Author)

AD-295 581 Div. 8, 14, 17, 22
(TISTW/PCR) OTS price $3.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
DEVELOPMENT OF BROAD-BAND ELECTROMAGNETIC ABSORBERS FOR ELECTRO-EXPLOSIVE DEVICES.
Monthly progress rept. no. 5, 1-30 Nov 62,
by Paul F. Mohrbach and Robert F. Wood.
30 Nov 62, 28p. incl. illus. tables, 5 refs.
(Rept. no. P-B1981-5)
(Contract N178-8087)
Unclassified report

DESCRIPTORS: *Ferrites, Conductivity, Radio-frequency attenuators, Attenuation, Production, Capacitors, Electric currents, Organic materials, Dielectrics, Insulating materials, Coatings, Instrumentation, Impedance, Transmission lines, Silver, Barium compounds, Titanates, Dielectric properties, Magnetic properties, Electromagnetic effects, Hazards, Electric detonators, Iron compounds, Equations, Mathematical analysis, Materials, Manufacturing methods.

A discussion of the effects of silvering toroids and the significant increase of attenuation resulting therefrom is given in table form. To eliminate effects of the silver, toroids were painted with an Aquadag solution on the inner and outer diameters. Attenuation values showed an increase but not to the same extent. This is probably because the Aquadag is not as conductive as the silver solution. It remains to be determined if all of the parameters are affected by silvering and to what extent. The ferrous ion content is important in the fabrication of ferrites. A rapid cooling operation has been employed in the procedure and ferrites having over 35 db/cm at 500 mc have been produced. The densities of our ferrites have been increased by using high firing temperatures. Experiments were conducted to determine the effect of a ferrite RF attenuator on different types of firing stimuli. (Author)

AD-295 601 Div. 8
(TISTE/OHD) OTS price $2.60

Harvard Coll. Observatory, Cambridge, Mass.
ANTENNA STUDY FOR Z-MODE SPACE RADIO PROGRAM,
by Sheldon S. Sandler. Aug 62, 24p. incl. illus. 11 refs. (Scientific rept. no. 3)
(Contract AF 19(604)6120, Proj. 8605)
(AFCRL 62-1058) Unclassified report

DESCRIPTORS: *Antennas, *Ionospheric propagation, Mathematical analysis, Plasma physics, Conductivity, Impedance, Wave transmission, Propagation.

The antenna system for the Z-mode study must not only act as a receptor for cosmic signals but must also be capable of measuring the local

properties of the ionospheric medium. The measurement of the plasma parameters (i.e., electron density N and collision frequency nu) is complicated by the proximity of the operating frequency (for the Z-mode) to the cyclotron frequency. By operating sufficiently above the cyclotron frequency, the anisotropy in the medium may be neglected. The collision frequency, however, is too small to be measured when the operating frequency is elevated above the cyclotron frequency. A theory has been developed which allows the antenna to operate near the cyclotron frequency. A preliminary antenna study would aid in determining the validity of the theory. An alternative method is available for measuring N and nu near the cyclotron frequency. In this method only the receiving properties of the antenna are needed. Since alternative methods are available for determining the actual plasma parameters the new theory may be easily checked. (Author)

AD-295 625 Div. 8, 9, 25
(TISTP/JW) OTS price $3.60

Space Technology Labs., Inc., Redondo Beach, Calif.
BACKSCATTER FROM INHOMOGENEOUS MEDIA,
by P. J. Lynch. Nov 62, 30p. 11 refs. (Rept. no. 6110-7837-RU-000)
(Contract AF 04(694)1)
(BSD TDR 62-350) Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Quantum mechanics, Vector analysis, Optics, Refraction, Scattering, Dielectric properties.

A WKB approximation is used to calculate cross sections for the 180 degree scattering of scalar and vector waves by a class of spherically symmetric, repulsive potentials. These potentials are such that the corresponding index of refraction has a unique zero. The scalar problem is discussed in the framework of quantum mechanics, and the result is just the classical cross section. Electromagnetic backscatter from a dielectric is found to be three-quarters of the scalar approximation in the extreme geometrical-optics limit. (Author)

AD-295 646 Div. 8
(TISTE/OHD) OTS price $1.25

Radio Corp. of America, Lancaster, Pa.
IMPROVED UNIFORMITY OF PHOTOCATHODE SENSITIVITY.
Final rept., May 61-May 62 on Electronic Tube Technology,
by A. H. Sommer, R. E. Simon, and B. H. Vine.
Nov 62, 37p. incl. illus. 16 refs.
(Contract AF 33(616)8303, Proj. 4156)
(ASD TDR 62-619) Unclassified report

DESCRIPTORS: *Photosensitivity, *Cathodes (Electron tubes), Processing, Alkali metal compounds, Photoelectric materials, Vapor plating, Thin films, Antimony, Antimonides, Sodium compounds, Potassium compounds, Cesium, Oxidation, Particle beams, Contamination, Alkali metals, Photoelectric cells.

The research objective was to gain a better understanding of the parameters determining the photoelectric sensitivity of multi-alkali photocathodes. An improved understanding should lead to practical improvements, in particular greater reproducibility of the activation process, greater uniformity over the cathode area, higher quantum efficiency, longer threshold wavelength, etc. The studies to be reported cover three approaches. First, an attempt was made to eliminate the effect of contaminating gases set free during the release of alkali metals in the later stages of the activation process. Second, the effects of systematic modifications of the cathode activation procedure, such as sequence of the processing stages, thickness of the Sb base layer, superficial oxidation, etc., were investigated. Third, a molecular beam technique was developed for Cs which made it possible to study the effect on the photocathode of the extremely small quantities of Cs which correspond to a fraction of a monatomic layer. (Author)

AD-295 659 Div. 8, 14, 25
(TISTE/OHD) OTS price $5.60

David Sarnoff Research Center, Princeton, N. J.
MAXIMIZING THE PERFORMANCE OF PHOTOCONDUCTORS.
Scientific rept. no. 3, 15 Mar-15 Sep 62,
by W. M. Anderson, R. H. Bube and others.
14 Nov 62, 59p. incl. illus. table, 60 refs.
(Contract AF 19(604)8353, Proj. 4608)
(AFCRL 62-927) Unclassified report

DESCRIPTORS: *Photoconductivity, *Single crystals, *Crystals, *Photoelectric materials, Hall effect, Insulating materials, Electric insulation, Resistance, Solid state physics, Selenium, Measurement, Laboratory equipment, Electrodes, Electric currents, Transients, Space charges, Probability, Mathematical analysis, Organic compounds, Semiconductors, Cadmium compounds, Sulfides, Manufacturing methods.

The interpretation of Hall effect measurements in insulators and the related experimental problems are discussed in detail. A sample of amorphous selenium containing a large number of artificially introduced crystalline inclusions has been measured. This material yielded an n-type signal with a mobility of approximately 0.2 sq. cm/vs. A 'time-of-flight' method for studying carrier transport in insulators is reviewed. This consists of a measurement of the transit time of injected excess carriers flowing under space charge limitation. A general analysis of unipolar steady state space charge limited currents in insulators with non-planar electrode geometries is presented. The treatment encompasses collectively the following cases: trap free, single shallow trap level and exponential trap distribution, each for the plane parallel, cylindrical and hemispherical (point contact) electrode configurations. The electrical properties of the arsonium salt of tetracyanoquinodimethane (TCNQ) are examined in a preliminary effort to determine the contact properties of this material. (Author)

AD-295 664 Div. 8, 26
(TISTE/OHD) OTS price $2.60

Sylvania Electric Products, Inc., Woburn, Mass.
PRODUCTION ENGINEERING MEASURE FOR GALLIUM ARSENIDE VARACTOR DIODE.
Quarterly progress rept. no. 2, 1 Sep-30 Nov 62,
by T. H. Baker. 30 Nov 62, 18p. incl. illus. table.
(Contract DA 36-039-sc-86736)
Unclassified report

DESCRIPTORS: *Variable capacitors, *Diodes, *Manufacturing methods, *Semiconductors, Production, Diffusion, Zinc, Resistance, Gallium compounds, Arsenides, Gold alloys, Zinc alloys, Packaging, Electric terminals, Electrostatic capacitance, Industrial production.

Studies to obtain the processes necessary for the high volume production of gallium arsenide varactor diodes are described. These investigations include the areas of diffusion, contacting, mesa formation and packaging. Capacitance measurements on new package designs are tabulated. (Author)

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-295 676 Div. 8, 25, 6, 14
(TISTE/OHD) OTS price $1.60

Naval Ordnance Lab., Corona, Calif.
EFFECTS OF AGING ON LEAD SELENIDE DETECTORS.
Report for Jan-Dec 62,
by J. D. Merriam. 15 Jan 63, 24p. incl. illus. tables, refs. (Photodetector series rept. no. 55; NOLC rept. no. 576)
(WEPTASK RMGA-41-049/211-1/R008-03-002)
Unclassified report

DESCRIPTORS: *Infrared detectors, *Infrared photoconductors, *Aging, Storage, Low temperature research, Semiconductors, Temperature, Electrical properties, Test equipment, Resistance, Lead compounds, Selenides.

Results are reported of a study made on ten cooled PbSe photoconductive detectors that were stored at an ambient temperature of 22 C ± 2 for periods of from six to eight months. Six of the detectors were evaporated cells operated at dry ice temperatures; four were chemically deposited cells operated at liquid nitrogen temperatures. A small change in dark resistance appeared to be the only noticeable effect of aging. (Author)

AD-295 692 Div. 8, 26
(TISTE/CAM) OTS price $4.60

Bendix Semiconductor Div., Bendix Corp.,
Holmdel, N. J.
PRODUCTION RELIABILITY IMPROVEMENT PROGRAM FOR GERMANIUM TRANSISTOR 2N1430.
Quarterly progress rept. no. 2, 30 July-31 Oct 62 on Production Engineering Measure,
by Dennis Fallon, Henry Sivik and John Szafranski. 31 Oct 62, 1v. incl. illus. tables.
(Contract DA 36-039-sc-86723)
Unclassified report

DESCRIPTORS: *Transistors, *Manufacturing methods, Reliability, Resistance, Germanium, Single crystals, Growth, Chemical milling, Diffusion, Quality control, Processing, Alloys, Tables, Production.

Effort was continued toward improving production techniques to improve the reliability of the 2N1430 germanium transistor using as an objective a maximum operating failure rate of 0.05% per 1000 hours at a 90% confidence level of 25 C. Major areas considered were: (1) resistivity control, etch pit control, uniform penetration in diffusion, depth control in alloying, spreading and wetting in alloying, collector attachment, surface passivation, final preparation prior to sealing, gettering technique, and leak determination; (2) information and data to demonstrate the results in the areas of study; and (3) quality control measures to insure accuracy and reliability of the established process techniques. (Author)

AD-295 736 Div. 8, 26
(TISTE/OHD) OTS price $4.60

Radio Corp. of America, Somerville, N. J.
PRODUCTION ENGINEERING MEASURE ON 2N1708 SILICON PLANAR EPITAXIAL TRANSISTOR.
Quarterly rept. no. 2, 1 Aug-31 Oct 62,
ed. by L. R. Possemato. 31 Oct 62, 41p. incl. illus. tables.
(Contract DA 36-039-sc-86729)
Unclassified report

DESCRIPTORS: *Transistors, *Semiconductors, *Manufacturing methods, Reliability, Test methods, Production, Phosphorus compounds, Oxides, Electronic switches, Thermal stresses, Temperature, Life expectancy, Tests, Glass seals, Ceramic materials, Thin films, Oxidation, Silicon compounds, Diffusion, Electric terminals, Silicon.

AD-295 746 Div. 8
(TISTM/ODN) OTS price $2.60

hp associates, Palo Alto, Calif.
INVESTIGATION OF HOT ELECTRON EMITTER.
Scientific rept. no. 2, 1 Sep-30 Nov 62,
by M. M. Atalla. 30 Nov 62, 11p. illus. 10 refs.
(Contract AF 19(628)1637, Proj. 4608)
(AFCRL 62-957) Unclassified report

DESCRIPTORS: *Transistors, *Semiconductors, *Diodes, *Triodes, Operation, Electrical properties, Electrons, Thin films, Voltage, Electric currents, Silicon, Gold, Frequency.

Analysis is presented of the frequency performance of various metal-base hot carrier triode amplifiers which differ only in the type of hot carrier emitter they utilize. The triodes considered are: (1) the SMS, or semiconductor-metal-semiconductor, triode utilizing a Schottky barrier emitter; (2) the space charge limited emitter triode; and (3) the tunnel-emitter triode. The results are compared with the performance of the bipolar germanium junction transistor. It is shown that for all three hot carrier triodes, the maximum gain-band product increases with current density and approaches an asymptotic limit which is due to collector limitation. It is further shown, however, that this limit is closely approached at reasonable current density only by the SMS triode. At an emitter current density of 1000 amp/sq cm and a stripe width of 10 microns, the maximum gain-band products, or maximum oscillating frequencies, are 60 kmc/sec for the SMS triode, 38 for the space charge limited emitter triode, and 10 for the tunnel-emitter triode. (Author)

AD-295 775 Div. 8, 15
(TISTP/JW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A METHOD FOR GENERATING EQUIPROBABLE BINARY NUMBERS AND A DEVICE FOR ITS REALIZATION,
by I. A. Danil'chenko. 17 Jan 63, 4p. incl. illus. (Trans. no. FTD-TT-62-1435 from Soviet Patent No. 131141 (644100/26), 14 Nov 59)
Unclassified report

DESCRIPTORS: *Pulse generators, *Digital systems, USSR, Translations, Numbers, Conversion ratio.

AD-295 793 Div. 8
(TISTP/TL) OTS price $36.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
APPROXIMATE METHODS FOR ANALYZING NON-LINEAR AUTOMATIC SYSTEMS (Priblizhennye Metody Issledovaniya Nelineynykh Avtomaticheskikh Sistem),
by Ye. P. Popov and N. P. Pal'tov. 24 Jan 63,

990p. incl. illus. tables, 348 refs. (Trans. no. FTD-TT-62-910 from Fizmatgiz Gosudarstvennoye Izdatel'stvo Fiziko-Matematicheskoy Literatury, 792p. 1960, Moskva)

Unclassified report

DESCRIPTORS: *Non-linear systems, *Control systems, *Linear systems, *Servomechanisms, Hysteresis, Synthesis, Feedback, Oscillation, Airplanes, Electronic circuits, Translations, USSR, Errors, Tables, Automatic, Design, Harmonic analysis, Stability.

An account is given of the approximate methods which are simplest and easiest in practical application for the investigation and design of a definite class of nonlinear automatic systems, and are suitable for the solution of certain synthesis problems for such systems. The initial theoretical basis of these methods is formed by the ideas of harmonic balance and equivalent linearization propounded in the familiar works of N.M. Krylov and N.N. Bogolyubov, and also the special form of the small-parameter method developed in the works of B.V. Bulgakov. After the first applications of the method of harmonic balance to nonlinear control systems, which are due to L.S. Gol'dfarb, V.A. Kotel'nikov and R. Dzh. Kokhenburger, the methods indicated above were developed successfully for the solution of new problems in the investigation and design of nonlinear automatic systems. The different methods which are proposed for the solution of the diverse nonlinear problems that arise from practical requirements, which are reduced to concrete applications, are unified by the general idea of harmonic linearization of nonlinearities in its different forms. (Author)

AD-295 794 Div. 8, 25
(TISTE/OHD) OTS price $23.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ELECTRON PARAMAGNETIC RESONANCE (Elektronnyy Paramagnitnyy Rezonans),
by S. A. Al'tshuler and B. M. Kozyrev. 14 Jan 63, 469p. incl. illus. tables, refs. (Trans. no. FTD-TT-62-1086 from Gosudarstvennoye Izdatel'stvo Fiziko-Matematicheskoy Literatury, 368p., 1961, Moskva)

Unclassified report

DESCRIPTORS: *Paramagnetic resonance, Microwave spectroscopy, Crystals, Matrix algebra, Mathematical analysis, Ions, Hyperfine structure, Iron, Nickel, Crystal structure, Metallic crystals, Semiconductors, Free radicals, Paramagnetic salts, Amplifiers, Absorption, Spectrographic data, Translations, USSR.

In ionic crystals paramagnetic resonance permits a determination of the magnetic-center energy-level structure, of the minor details of the crystal-lattice structure, and of the parameters characterizing the magnetization kinetics; the study of crystal-lattice imperfections is particularly interesting. In liquid salt solutions, in metals and semiconductors, and in nuclear physics, paramagnetic resonance is a valuable method for the determination of structures, conduction electron properties, and nuclear moments, and is one of the most effective means of nuclear polarization. The paramagnetic resonance method is fruitful in chemistry, making possible the first detection of free radicals in amounts of 10 to the -13th power mole. Paramagnetic resonance has found an important application in radio, for the design of a new type of low-noise amplifier. Theoretical and experimental results pertaining to ionic crystals were dealt with in detail, as such crystals are investigated by paramagnetic resonance methods. The book covers basic literature on electron paramagnetic resonance up to about 1959. The authors have summarized important theoretical results and experimental data. (Author)

AD-295 810 Div. 8, 27
(TISTP/JW) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
JOURNAL OF ENGINEERING PHYSICS (SELECTED ARTICLES).
28 Jan 63, 22p. incl. illus. table, refs. (Trans. no. FTD-TT-62-1568 from Inzhenerno-Fizicheskiy Zhurnal, 5:3, pp. 45-50, 66-71, 1962)

Unclassified report

DESCRIPTORS: *Flames, *Gas turbines, Microwaves, Translations, USSR, Heat transfer, Fluid flow, Electrical conductance, Temperature.

AD-295 826 Div. 8, 18, 30
(TISTE/OHD) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A METHOD FOR REPRESENTING CODE VALUES OF OPTIMAL NONUNIFORM CODES ON THE MASKS OF CATHODE-RAY DECODING TUBES,
by D. A. Novik. 23 Jan 63, 4p. (Trans. no. FTD-TT-64461 from Soviet Patent No. 136099 (670433/26) 20 June 1960)

Unclassified report

DESCRIPTORS: *Coding, *Cathode ray tubes, Technological intelligence, Trigger circuits, Mathematical analysis, Translations, USSR, Cryptography.

A method is shown for representing code values of optimal nonuniform codes on the masks of cathode-ray decoding tubes, where the duration of the code combination is recorded horizontally, and the order number of the code combination to be received is recorded vertically. Since the order number B(p(i)), by definition, B(p(i))= Summation of s(N)a to the (N-1) over the interval from N=1 to N=A(p(i)) where A(p(i)) is the duration of a code combination 1 of the symbol, and s (N) is the significance of a code digit (from the radix of the code a), the number of which is N, then the required resolution of the tubes increases rather rapidly with an increase in the maximum (in duration) code combination of an optimal nonuniform code A(p(m)). The proposed method allows the resolution of cathode-ray decoding tubes to be used more fully, since the mask obtained as a result of using the proposed method has a square shape. The essence of the method is the combining of numbers corresponding to the duration of a code combination and to its order number, and division of the number obtained into approximately equal parts, which form the horizontal and vertical coordinates of the code value for recording on the mask of the tube. (Author)

AD-295 832 Div. 8
(TISTE/OHD) OTS price $8.10

Electro-Voice, Inc., Buchanan, Mich.
H-189( )/GR.
Final rept.,
by Robert C. Ramsey. 1962, 80p. incl. illus.
(Contract DA 36-039-sc-87244)

Unclassified report

DESCRIPTORS: *Microphones, *Telephone receivers, *Telephone transmitters, Design, Plastics, Human engineering, Switches, Earphones, Walkie-talkies.

The design, development and testing of the H-189( )/GR handset are described. The H-189( )/GR is a miniature handset incorporating blast-proof, shock-proof, watertight dynamic earphones and microphones. This handset is to be used with military man-pack radio equipment, in particular, the AN/VRC-12 radio equipment. (Author)

AD-295 843 Div. 8
(TISTW/PCR) OTS price $13.00

Airborne Instruments Lab., Inc., Deer Park, N. Y.
INTERFERENCE ANALYSIS OF NEW COMPONENTS AND CIRCUIT TECHNIQUES,
by S. Becker, L. M. Orloff and others. Sep 62, 185p. incl. illus. 14 refs. (Rept. no. 1760-TN-1)
(Contract AF 30(602)2690)
(RADC TDR 62-484) Unclassified report

DESCRIPTORS: *Masers, *Parametric amplifiers, *Diodes, *Transistors, *Ferrites, *Crystal mixers, *Interference, Electronic circuits, Power amplifiers, Low frequency, Ultra high frequency, Non-linear systems, Mathematical analysis, Equations, Energy, Theory, Amplifiers, Modulation, Band pass filters, Experimental data, Solid state physics.

AD-295 978 Div. 8
(TISTE/CRJ) OTS price $4.60

Sylvania Electric Products, Inc., Buffalo, N. Y.
DEVELOPMENT OF C- AND X-BAND POWER GENERATORS.
Quarterly rept. no. 1, 1 June-31 Aug 62,
by J. Kellett. 5 Oct 62, 39p. incl. illus. tables (Rept. no. A35-5-5.0-10)
(Contract DA 36-039-sc-90757, Proj. 3A99-21-002)
Unclassified report

DESCRIPTORS: *Pulse generators, *Radiofrequency generators, C band, X band, S band, Microwave frequency, Solid state physics, Transistors, Frequency multipliers, Test equipment, Power amplifiers, Pulse amplifiers, Crystal oscillators, Impedance, Radiofrequency power, Microwaves.

Efforts are being made to develop C- and X-band solid-state, pulsed-power generators. The indirect power generation technique employing a transistorized exciter and a cascaded chain of frequency multipliers was selected. The exciter output frequency has been tentatively set at 156.25 mc and the multiplier chain being considered is a cascade chain of six frequency doublers. The exciter design objectives were established and detailed investigations of oscillator stability under pulsed operation, power amplifier pulsed power gain and pulse generation techniques were initiated. An analytical treatment of oscillator load impedance variations predicts frequency stability of 1 x 10 to the -6th power for the selected configuration. The effect of junction temperature variations upon transistor power gain is treated and an expression for the maximum power output of a transistor is derived. (Author)

AD-295 982 Div. 8, 26
(TISTE/OHD) OTS price $2.60

General Electric Co., Owensboro, Ky.
Z-5267 CERAMIC TETRODE, 40 WATTS AT 3000 MC. PRODUCTION ENGINEERING MEASURE.
Quarterly progress rept. no. 2, 1 Sep-30 Nov 62, by V. W. Amoth. 30 Nov 62, 18p. incl. illus. tables.
(Contract DA 36-039-sc-86735)
Unclassified report

DESCRIPTORS: *Tetrodes, *Manufacturing methods, S band, Industrial production, Reliability, Brazing, Cavity resonators, Ceramic materials, Electron tubes.

A summary of the 40 w, 3000 mc ceramic tetrode production engineering program is described in detail. A few tubes were exhausted and RF tests completed on one tube. Assemblies were built up to provide for the contractural delivery of ten tubes. Trouble is being encountered in building efficient cavities. (Author)

AD-295 986 Div. 8
(TISTE/CRJ) OTS price $1.10

Aerospace Information Div., Washington, D. C.
MICROMINIATURE DEVICES FOR ELECTRONICS.
15 Jan 63, 3p. incl. illus. (AID rept. no. S-63-13; Trans from First scientific and technical conference of schools of higher education on the microminiaturization of radio-electronic devices. Izvestiya vysshikh uchebnykh zavedeniy. Radiotekhnika 5:4, pp. 538-539, 1962. (S/142/62/000/004))
Unclassified report

DESCRIPTORS: *Microminiaturization (Electronics), Resistors, Printed circuits, Electronic equipment, Radio equipment, USSR.

9. FLUID MECHANICS

AD-294 956 Div. 9, 27, 12
(TISTA/FRL) OTS price $10.50

Aerojet-General Corp., Sacramento, Calif.
ANALYSIS OF THE FLOW OF GAS-PARTICLE MIXTURES IN TWO-DIMENSIONAL AND AXISYMMETRIC NOZZLES,
by J. D. Hoffman. 1 Dec 62, 137p. incl. illus. tables, refs. (Rept. no. 0162-01TN-16)
(Contract AF 33(600)36610)
(AFBSD TDR 62-144) Unclassified report

DESCRIPTORS: *Rocket motor nozzles, Theory, Equations, Supersonic flow, Subsonic flow, Transonic flow, Mathematical analysis, Programming, Exhaust gases, Particles, Partial differential equations, Computers, Axially symmetric flow, Gas flow.

From theoretical studies of two-phase flow of gas-particle mixtures in rocket nozzles, the governing equations for two-dimensional and axisymmetrical flows have been derived. Characteristic equations have been put into finite difference form and a mathematical model has been developed for a general interior point in the supersonic flow field. The subsonic and transonic flow fields have been investigated. To integrate the subsonic, transonic, and supersonic solutions, a mathematical model will be programmed for the IBM 7090 computer that will determine nozzle performance for given nozzle contour and motor conditions. (Author)

AD-294 959 Div. 9, 15, 25, 30
(TISTW/PCR) OTS price $9.10

Space Sciences Lab., General Electric Co.
Philadelphia, Pa.
SOLUTION OF VISCO-PLASTIC EQUATIONS FOR AXISYMMETRIC HYPERVELOCITY IMPACT.
Summary rept. no. 2, 3 Nov 61-2 Nov 62,
by T. D. Riney. Dec 62, 91p. incl. illus. tables, 39 refs.
(Contract AF 08(635)1713, Proj. 9860)
(APGC TDR 62-74) Unclassified report

DESCRIPTORS: *Hypervelocity projectiles, *Impact shock, Mathematical analysis, Dynamics, Metal plates, Equations of state, Compression shock, Fracture (Mechanics), Stresses, Penetration, Cratering, Computer logic, Computers, Programming, Theory, Resistance, Creep, Plastic flow, Wave transmission, Thermodynamics, Difference equations, Shock resistance, Shock waves, Particles, Bibliography, Equations.

The dynamic response of a metallic body when impacted by a hypervelocity projectile is a complicated phenomenon involving the introduction of damage mechanisms which are not completely understood, even when independently operative. Tentative phenomenological relations are proposed for the hypervelocity impact regime which include the flow resistance coefficient (which is of fundamental importance in the visco-plastic model for high speed impact), the equation of state for both compressive and rarefaction regions of the metal, and a fracture criterion for high intensity tri-axial stress distributions of extremely short duration. A step-by-step description of a computational procedure is presented for the solution of the visco-plastic equations governing the axisymmetric hypervelocity impact situation. The procedure incorporates the above phenomenological relations which are necessary for a realistic description of the penetration and cratering processes. (Author)

AD-294 969 Div. 9, 31
(TISTM/EJH) OTS price $4.60

St. Anthony Falls Hydraulic Lab., U. of Minn., Minneapolis.
TURBULENT BOUNDARY LAYER FLOW OVER A FLAT PLATE VIBRATING WITH TRANSVERSE STANDING WAVES,
by Albert G. Mercer. Sep 62, 46p. incl. illus. 9 refs. (Technical paper no. 41, Series B)
(Contract Nonr-71038, Proj. SR-009-01-01)
Unclassified report

DESCRIPTORS: *Turbulent boundary layer, *Turbulent flow, *Hydrodynamics, *Ship plates, Drag, Ship hulls, Vibration, Theory, Mathematical analysis, Metal plates, Water tunnels.

An attempt is made to show theoretically that the drag caused by a turbulent boundary layer on a smooth flat plate vibrating with low amplitude transverse standing waves is the same as for a non-vibrating plate, provided the wave celerity of the component traveling waves is greater than about 3.5 times the free stream velocity. Experiments conducted in a water tunnel with a rectangular cross-section having one vibrating wall showed no measurable change in boundary layer velocities, as compared to non-vibrating conditions, for frequencies ranging from 15 to 122 cps and free stream velocities ranging from 2.4 to 15 fps. The lowest wave celerity to free stream velocity ratio tested was 2.54. (Author)

AD-294 975 Div. 9
(TISTA/FRL) OTS price $4.60

Polytechnic Inst. of Brooklyn, N. Y.
AN INVESTIGATION OF A THREE-DIMENSIONAL TURBULENT BOUNDARY LAYER IN HYPERSONIC FLOW.
Report on Aerothermodynamic Investigations,
by Gennaro F. Aiello. Dec 62, 39p. incl. illus. tables, 24 refs. (PIBAL rept. no. 773)
(Contract AF 33(616)7661, Proj. 7064)
Unclassified report

DESCRIPTORS: *Blunt bodies, Turbulent flow, Enthalpy, Theory, Model tests, Wind tunnel models, Pressure, Heat transfer, Boundary layer, Hypersonic flow, Aerodynamic heating.

Turbulent heating rates were measured by means of the shrouded model technique on a blunted cone at angle of attack. The Reynolds number, based on conditions at the stagnation point, was varied from 1.7 x 10 to the 6th power to approximately 3.7 x 10 to the 6th power. The enthalpy ratio (stagnation to wall) varied from 2.1 to approximately 1.5. The experimental data are compared to the flat-plate reference-enthalpy theory applied along the inviscid streamlines. It is shown that this relatively simple method is in reasonable agreement with the data. (Author)

AD-294 976 Div. 9
(TISTA/FRL) OTS price $5.60

Rome U. (Italy)
ON GUIDANCE AND LANDING ACCURACY REQUIREMENTS IN RE-ENTRY TRAJECTORIES,
by Luigi Broglio. June 61, 51p. incl. illus. 2 refs. (Technical note no. 5; SIARgraph no. 63)
(Contract AF 61(052)198)
Unclassified report

DESCRIPTORS: *Re-entry vehicles, Re-entry aerodynamics, Landing, Satellite vehicle trajectories, Spaceships, Ablation, Velocity, Heat transfer, Deceleration, Perturbation theory, Guidance.

Problems referring to re-entry trajectory guidance requirements are solved. Errors in velocity and angles, represented by means of errors in limiting conic parameters, produce variations in maximum deceleration, total heat transferred, angular ranges, etc. Charts to evaluate such variations are described. Perturbations with respect to the simplifying assumptions are considered, and a general small-perturbations theory is developed. Any perturbation gives rise to changes in the limiting conic parameters; by considering the effect of a unit perturbation, the effect of a distributed set of them is obtained by simple integration. (Author)

AD-294 980 Div. 9
(TISTA/FRL) OTS price $3.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
THE APPROXIMATE FLOW CHARACTERISTICS IN THE BASE REGION OF A HYPERSONIC AXI-SYMMETRIC BODY,
by K. S. Wan. Sep 62, 29p. incl. illus. tables, 1 ref. (Rept. no. R62SD16)
(Contract AF 04(647)269)
Unclassified report

DESCRIPTORS: *Blunt bodies, *Conical bodies, *Aerodynamic configurations, Laminar boundary layer, Wake, Gas flow, Integral equations, Spark shadowgraph photography, Algebra, Functional analysis, Boundary layer, Turbulence, Hypersonics.

An approximate method of solution is given to determine the location of the rear stagnation point in the viscous base flow region together with the size of the viscous wake and the flow characteristics there. It is useful as a means of obtaining the initial conditions for the near wake calculations. The results obtained show that one must consider the finite boundary layer at the base in determining the location of the rear stagnation point and the viscous wake width there. In general, the viscous wake at the rear stagnation point consists of a shell of hot gas surrounding a cool core. (Author)

AD-295 013 Div. 9
(TISTA/FRL) OTS price $9.10

Aerospace Corp., Los Angeles, Calif.
AERODYNAMIC INFLUENCE COEFFICIENTS FROM

Division 9 - FLUID MECHANICS

SLENDER-BODY THEORY: ANALYTICAL DEVELOPMENT AND COMPUTATIONAL PROCEDURE,
by William P. Rodden, Edith F. Farkas, and George Y. Takata. 31 Oct 62, 102p. incl. illus. 6 refs. (Rept. no. TDR-169(3230-11)TN-6)
(Contract AF 04(695)169)
(SSD TDR 62-149) Unclassified report

DESCRIPTORS: *Conical bodies, Theory, Deflection, Load distribution, Programming, Computers, Moments, Oscillation, Integral equations, Equations, Mathematical analysis, Aerodynamics.

A method is reviewed for computing the aerodynamic influence coefficients (AICs) for slender bodies. The method is based on the unsteady slender-body theory by Miles (On steady Motion of Slender Bodies, Aeronautical Quarterly, 2(1950), 183-194) and its extension to obtain the AICs by Rodden and Revell (The status of Unsteady Aerodynamic Influence Coefficients, Institute of Aerospace Sciences, SMF Fund Paper No. FF-33, Jan 1962). The simplicity of the slender-body theory permits the definition of a number of sets of AICs for use in transient analysis. The Aerospace IBM 7090 Computer Program No. HM15 provides the AICs in printed and optional punched-card output formats. The program capacity is 50 control points and, in the oscillatory case, 50 values of reduced velocity. (Author)

AD-295 046 Div. 9, 25
(TISTP/VGW) OTS price $5.60

Centre National de' Etudes et de Recherches Aeronautiques, Brussels (Belgium).
A ONE DIMENSIONAL MATHEMATICAL MODEL FOR THE BOLTZMANN EQUATION.
Technical note no. 1 on Mathematical Study on Kinetic Theory of Gases Applied to Low Density High Speed Flow,
by Jean J. Smolderen. Oct 62, 56p. incl illus. 13 refs. (Rept. no. TCEA TN 10)
(Contract AF 61(052)486)
Unclassified report

DESCRIPTORS: *Superaerodynamics, *Special functions, Partial differential equations, Integral equations, Gases, Molecules, Supersonic flow, Shock waves, Heat transfer, Quantum mechanics, Numerical analysis.

A one dimensional model for the Boltzmann equation, based on a Fokker Planck-like differential collision operator is proposed, to study the validity of the usual approximation methods as well as the behavior of solutions near the free molecule limit. The corresponding fluid dynamic equations are derived and the existence and structure of shocks are studied. The distribution function is obtained for the unsteady, spatially uniform problem and the existence of an infinite number of relaxation times and modes is proved. Linearized versions of the model equation are derived. The near free molecule limit for solutions of the full model equation is briefly investigated for steady state, and a boundary layer type of behavior is found to exist. The leading terms in the deviation from free molecule data are found to be of the order of the cube root of an interaction parameter playing a role analogous to the Knudsen number. (Author)

AD-295 082 Div. 9
(TISTA/GEC) OTS price $5.60

Mississippi State U., State College.
FLIGHT TESTING OF THE MARVEL AND MARVELETTE AIRFOIL SECTION,
by Sean C. Roberts. 1 May 62, 46p. incl. illus. 8 refs. (Research rept. no. 38)
(Contract Nonr-97801)
Unclassified report

DESCRIPTORS: *Airfoils, Model tests, Flight testing, Gliders, Boundary layer control systems, Design, Pressure, Test methods, Lift, Drag, Instrumentation, Aerodynamic configurations.

Airfoil sections for low speed flying need to be highly cambered with the point of maximum camber well forward to ensure low pitching moments whereas for maximum cruise speeds a thin low-cambered airfoil is required. To satisfy both requirements, a compromise was reached in the form of a variable cambered airfoil. The uncambered airfoil was an excellent airfoil for the cruise condition due to its low drag and, when cambered, the airfoil was very suited to high lift coefficient flying. To ensure maximum utilization of the fully cambered wing, a turbulent high lift boundary layer control system was necessary to prevent turbulent boundary layer separation. The airfoil was a combination of low drag airfoil sections both forward and aft of the spar with an increase in leading edge radius in an attempt to prevent laminar separation at high angles of attack. When the airfoil is in the cambered position, however, only the section forward of the spar retains its original shape and with the flight loads on the relatively flexible wing, it would be difficult to pin down the exact coordinates of the airfoil. Results of flight testing of this MARVEL airfoil glove section are reported. Comparison is made between theory and experimental results. (Author)

AD-295 094 Div. 9, 15
(TISTP/WH) OTS price $9.10

Technical Research Group, Syosset, N. Y.
LINEARIZED THEORY OF THE UNSTEADY MOTION OF A PARTIALLY CAVITATED HYDROFOIL.
Report on Fundamental Hydromechanics Research Program,
by Herbert Steinberg. Mar 62, 100p. incl. illus. 3 refs. (Rept. no. TRG-153-SR-1)
(Contract Nonr-343400, Proj. S-4009-01-01)
Unclassified report

DESCRIPTORS: *Hydrofoils, *Cavitation, *Hydrodynamics, *Load distribution, Elasticity, Differential equations, Integral equations, Simultaneous equations, Motion, Surfaces, Oscillation.

A linearized theory for the unsteady motion of a partially cavitated flat hydrofoil in two dimensions is carried out. A second linearization procedure is used, based on ideas of Timman and Guerst, to obtain the unsteady pressure distribution around the hydrofoil and the resulting force and moment, as functions of the cavitation number and Strouhal number for given pitch and/or heave. (Author)

AD-295 105 Div. 9
(TISTA/FRL) OTS price $2.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
ON THE STABILITY OF AXI-SYMMETRICAL WAKES OF A BINARY MIXTURE OF COMPRESSIBLE FLUIDS,
by S. I. Pai and H. Li. Aug 62, 18p. incl. illus. 10 refs. (Rept. no. R62SD79)
(Contract AF 04(647)617)
Unclassified report

DESCRIPTORS: *Guided missiles, *Compressible flow, Stability, Turbulence, Hypersonic flow,

Ablation, Equations of state, Equations, Motion, Partial differential equations, Mathematical analysis, Subsonic flow, Supersonic flow, Wake, Axially symmetric flow.

The stability equations of an axi-symmetric flow of a binary mixture of compressible fluids was derived and studied. As in the incompressible case, the stability equations may be reduced approximately to the corresponding equations of two-dimensional flow by proper transformation. An approximate formula for minimum critical Reynolds number of stability is suggested for subsonic and low supersonic Mach numbers, and examples for an axi-symmetrical wake of a compressible flow are given. (Author)

AD-295 111 Div. 9
(TISTA/FRL) OTS price $3.60

Columbia U., New York.
IMPACT ON THE SURFACE OF A COMPRESSIBLE FLUID,
by Richard Skalak and David Feit. Jan 63, 29p. incl. illus. 12 refs. (Technical rept. no. 31; CU-1-63)
(Contract Nonr-26686, Proj. NR 064-428)
Unclassified report

DESCRIPTORS: *Fluids, *Surfaces, Supersonic flow, Wedges, Compressible flow, Integral equations, Velocity, Pressure, Mathematical analysis, Impact shock.

The pressure field generated by the impact of a rigid or flexible body on the surface of an inviscid, compressible fluid is considered. Some general results for the forces generated by the impact are given. Pressure distributions for rigid wedges are computed from known analagous solutions of linearized supersonic airfoil theory. In the impact problem, the transition from compressible to incompressible behavior is demonstrated as the velocity of impact is reduced. (Author)

AD-295 144 Div. 9
(TISTA/GEC) OTS price $6.60

RAND Corp., Santa Monica, Calif.
THE GROWTH OF THE HYPERSONIC TURBULENT WAKE BEHIND BLUNT AND SLENDER BODIES,
by Paul S. Lykoudis. Jan 63, 57p. incl. illus. table, 12 refs. (Memo. no. RM-3270-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Blunt bodies, *Conical bodies, Hypersonics, Theory, Turbulent flow, Growth, Enthalpy, Boundary layer, Shock waves, Partial differential equations, Wake.

A study was made of a theory for the calculation of the growth of the turbulent wake formed behind a blunt body moving at hypersonic speeds. The semiempirical subsonic-wake theory, based on the notion of eddy diffusivity, was modified to account for compressibility effects. The gas was assumed to be in thermodynamic equilibrium. A number of suitable approximations were made, resulting in a closed-form solution. Several plots showing the growth of the width of the turbulent core downstream are presented for different Mach numbers and different values of the enthalpy prevailing at the center of the neck of the wake. It was found that compressibility effects for blunt bodies are limited in general up to about 1000 diameters downstream. Beyond this distance the wake grows with the 1/3 power rule, like a subsonic incompressible wake, with no dependence on the Mach number. The fundamental equations were written for sharp bodies for which the boundary-layer effects are important. It was found that the enthalpy decay along the axis downstream is faster for thin bodies than it is for blunted ones. (Author)

AD-295 145 Div. 9
(TISTA/FRL) OTS price $7.60

RAND Corp., Santa Monica, Calif.
SKIN FRICTION AND STABILITY OF A LAMINAR BINARY BOUNDARY LAYER ON A FLAT PLATE,
by J. F. Gross. Jan 63, 71p. incl. illus. tables, 11 refs. (Memo. no. RM-3485-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Metal plates, *Laminar boundary layer, Turbulent boundary layer, Velocity, Friction, Heat transfer, Boundary layer, Equations, Cooling, Injection, Carbon dioxide, Hydrogen, Iodine, Aerodynamics, Stability.

The problem of a laminar boundary layer on a flat plate with mass transfer. Previous work is reviewed and the fundamental equations are derived. The case of an incompressible laminar boundary layer without heat transfer with hydrogen, carbon dioxide, and iodine injection is solved. Velocity and concentration profiles and skin-friction coefficients are calculated and discussed. Surface injection of a foreign material into the boundary layer reduces the skin-friction coefficient. The stability of an incompressible laminar boundary-layer with mass transfer is estimated using the Lin approximation and is shown to decrease as the molecular weight of the injected substance decreases. (Author)

AD-295 147 Div. 9
(TISTA/FRL) OTS price $2.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
CHEMICAL KINETIC REGIMES OF HYPERSONIC FLIGHT SIMULATION,
by Donald J. Harney. Jan 63, 20p. incl. illus. 19 refs. (Rept. no. AEDC TDR 63-3)
(AF Proj. 8952)
Unclassified report

DESCRIPTORS: *Hypersonic wind tunnels, *Hypersonic flow, Blunt bodies, Shock, Enthalpy, Pressure, Temperature, Velocity, Model tests, Dissociation, Chemical reactions, Chemical equilibrium.

The requirements for hypersonic test facilitie are evaluated on the basis of chemical kinetic phenomena. Flight conditions are divided into three broad chemical kinetic regimes; chemical effects negligible, non-equilibrium chemistry, and chemistry in equilibrium. On the basis of this division, it is recommended that a wide class of hypersonic testing, particularly that relating to low density phenomena, be accomplished without full simulation of flight conditions. Approaches to the simulation of flight in the non-equilibrium regime are suggested, and a brief review of the equilibrium regime indicates that test capability may be limited more from economic rather than technical considerations. (Author)

AD-295 154 Div. 9
(TISTW/PCR) OTS price $9.60

Institute of Engineering Research, U. of Calif., Berkeley.
HYPERSONIC FLOW OVER A SLENDER CONE WITH GAS INJECTION,
by Hartley H. King. 5 Nov 62, 105p. incl. illus. tables, 28 refs. (Series no. 196, Issue no. 1; Technical rept. no. HE-150-205)
(Contract Nonr-22245)
Unclassified report

DESCRIPTORS: *Hypersonic flow, *Gases, *Injection, Drag, Pressure, Wind tunnels, Theory,

Boundary layer, Experimental data, Wind tunnel models, Friction, Photographs, Aerodynamic data, Tables, Tests.

The main object of the present study was the experimental investigation of the effect of gas injection on the drag and pressure distribution on a 5 degree half-angle porous cone. Both helium and air injection were employed at two Mach-Reynolds number combinations attainable in the Berkeley low density wind tunnel. The first part of the report presents a general discussion of the experiment, the experimental data obtained, and the comparison of these data with theory. Section 2 is a detailed discussion of the experimental procedure and the methods of data reduction, while Section 3 presents the approximate boundary layer analysis which is useful for interpreting the experimental data. A discussion of the accuracy of the various experimental results and tabulations of data appear in the Appendix. (Author)

AD-295 177 Div. 9, 22, 30
(TISTW/PCR) OTS price $2.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
SOME EXPERIMENTS WITH THE LIQUID-FILLED, IMPULSIVELY STARTED, SPINNING CYLINDER,
by Gene Sokol. Sep 62, 20p. incl. illus. 3 refs.
(Technical note no. 1473)
(Proj. 503-03-001)
Unclassified report

DESCRIPTORS: *Cylindrical bodies, *Spin stabilized ammunition, *Test equipment, Motion, Geometry, Viscosity, Theory, Tests, Test methods, Photographs, Dynamics, Spin, Liquids.

Some experiments with the liquid-filled, impulsively started spinning cylinder are described. The main emphasis was directed toward studies of secondary motions within the fluid. The variables of these experiments were the geometry of cylindrical cavity and fluid viscosity. (Author)

AD-295 447 Div. 9, 25
(TISTW/JEA) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MEASUREMENT OF TURBULENT TEMPERATURE PULSATIONS IN LIQUID FLOW,
by V. I. Subbotin, M. Kh. Ibragimov and Ye. V. Nomofilov. 13 Dec 62, 14p. incl. illus. 5 refs.
(Trans. no. FTD-TT-62-1455 from Teploenergetika, No. 3, pp. 64-67, 1962)
Unclassified report

DESCRIPTORS: *Turbulent flow, *Atomic energy engineering, *Turbulent boundary layer, *Amplitude modulation, *Frequency modulation, Atomic energy levels, Thermocouples, Thermoelectricity, Potentiometers, Stabilization, Fluid mechanics, Thermal insulation, Heat of solution, Temperature, Measurement, Pulse analyzers, Liquid metals, Heat transfer, Fluid flow.

The turbulent temperature pulsations associated with the flow of liquid metal and water in a tube have been measured. Certain laws dealing with the variation in the amplitude and frequency of pulsations in turbulent liquid flow have been established. Under conditions of heat transfer the velocity pulsations of a turbulent liquid flow result in turbulent temperature pulsations. The experimental study of turbulent pulsations is made to obtain information regarding the internal structure of the flow and the mechanism of heat transfer in the case of turbulent flow of a liquid. (Author)

AD-295 471 Div. 9, 31
(TISTP/JEA) OTS price $11.50

David Taylor Model Basin, Washington, D. C.
COMPARISON OF THEORY AND EXPERIMENT FOR MARINE CONTROL SURFACE FLUTTER,
by Ralph C. Leibowitz and Donald J. Belz. Aug 62, 151p. incl. illus. tables, 30 refs. (Rept. no. 1567)
Unclassified report

DESCRIPTORS: *Flutter, *Towed bodies, *Ships, *Oceans, Experimental data, Damping, Analysis, Range, Hydrodynamics, Statistical analysis, Mathematical analysis, Analog computers, Digital computers, Vibration, Stability, Ship hulls, Marine rudders, Control surfaces, Marine engineering, Surface area.

Both the Extended Simplified Flutter Analysis and Modified Theodorsen Flutter Analysis, proposed by McGoldrick and Jewell, are applied to the towed marine body control surface flutter apparatus. Predictions of vibrational stability and instability based on these analyses are compared with stable and unstable (classical flutter) vibrations observed in the apparatus for towing speeds in the range of 0 to 20 knots. The comparison of predicted and observed values of damping and critical flutter speeds shows that the Modified Theodorsen Analysis gives a consistently better agreement with experimental data than does the Extended Simplified Analysis; moreover, the results of the former analysis are in good agreement with available experimental data, whereas the results of the latter analysis are not. To extend the range of mass unbalance, speed, and other parameters that show good agreement between theory and experiment, certain studies that will yield refinements to the Modified Theodorsen Analysis are proposed. (Author)

AD-295 482 Div. 9, 25
(TISTP/JEA) OTS price $4.60

Georgia Inst. of Tech., Atlanta.
VISCOUS COMPRESSIBLE FLUID FLOW UNDER THE INFLUENCE OF A RESONANT ACOUSTIC FIELD.
Interim technical report on Mechanics of Flight,
by Kenneth R. Purdy and Thomas W. Jackson.
Oct 62, 42p. incl. illus. 9 refs.
(Contract AF 33(616)8396, Proj. 7063)
(ARL 62-457) Unclassified report

DESCRIPTORS: *Viscosity, *Fluid flow, *Resonance, *Compressible flow, Fluid mechanics, Heat transfer, Amplitude modulation, Sonar pulses, Convection, Theory, Mathematical analysis, Integral equations, Numerical analysis, Differential equations, Thermodynamics, Vortices, Velocity, Acoustics, Resonance.

An analytical solution is presented for low Mach number viscous compressible channel flow under the influence of a resonant acoustic field. The solution predicts the existence of standing vortices in the flow and that the ratio of the maximum vortics to the half width of the channel is solely a function of the parameter M/M sub o squared where M is the Mach number based on the average through flow velocity and M sub o is the acoustic Mach number based on the maximum amplitude of the time dependent velocity. The order of magnitude analysis which was used to reduce the equations of motion required that M/M sub o squared should be less than approximately ten. The existence of standing vortices was confirmed experimentally by a visualization study of tube flow. Typical flow fields are shown both graphically and photographically. (Author)

AD-295 495 Div. 9
(TISTP/JW) OTS price $2.60

Massachusetts Inst. of Tech., Cambridge.
MAGNETOHYDRODYNAMIC POWER GENERATION - ITS PRINCIPLES AND PROBLEMS,
by W. Craig Moffatt. Jan 63, 18p. illus. 13 refs. (Proj. Squid technical rept. no. MIT-29-P)
(In cooperation with Virginia U., Charlottesville, Contract Nonr-362300, Proj. NR 098-038)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Electric power production, High temperature research, Gases, Magnetic fields, Fluid flow, Conductors, Electrical conductance, Power plants, Generators.

The basic operating principles of a magnetohydrodynamic generator are presented, and some of the major problems yet to be overcome before such devices become practical realities are described. Typical power plant arrangements incorporating MHD channels are set forth, and estimates of the relative costs of plants and power production for a number of configurations are presented. (Author)

AD-295 503 Div. 9
(TISTP/JW) OTS price $11.00

Stanford U., Calif.
A LINEARIZED THEORY FOR ROTATIONAL, SUPERCAVITATING FLOW,
by Robert L. Street. Oct 62, 131p. incl. illus. tables, 25 refs. (Technical rept. no. 16)
(Contract Nonr-22556, Proj. S-R009-01-01)
Unclassified report

DESCRIPTORS: *Fluid flow, *Hydrofoils, Linear systems, Vortices, Viscosity, Gravity, Velocity, Perturbation theory, Boundary layer, Partial differential equations, Cavitation, Measurement.

Forces acting on slender bodies, namely hydrofoils and wedges, in rotational, supercavitating flow are predicted. Methods are given for establishing not only qualitative but quantitative measures of the effects of rotation in linearized, supercavitating flows. A linearized theory is developed for steady, two-dimensional flow under the assumption that the flow has a constant vorticity throughout. The effects of gravity, viscosity, and surface tension are neglected. Tulin's original closed-cavity model is employed. A basic assumption of the theory is that the slender body-cavity combination causes only small perturbations in the velocity components of the basic shear flow. The stream function of the rotational flow satisfies Poisson's equation, which is a linear, inhomogeneous, partial differential equation. By using a particular solution of this equation, the linearized, rotational problem is reduced to a problem involving Laplace's equation and harmonic perturbation velocities. The boundary conditions for the perturbation velocities are established from facts known about the body-cavity combination in the supercavitating shear flow. The resulting boundary value problem is solved by the use of conformal mapping and singularities from thin airfoil theory. (Author)

AD-295 720 Div. 9, 25
(TISTP/JW) OTS price $3.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
MAGNETOHYDRODYNAMIC BOUNDARY LAYERS,
by A. Sherman. Jan 63, 34p. incl. illus. 8 refs.
(Rept. no. R63SD4)
(Contract AF 49(638)914)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Fluid flow, Equations, Compressible flow, Acceleration, Boundary layer, Plasma physics.

AD-295 721 Div. 9, 25
(TISTP/JW) OTS price $3.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
MAGNETOHYDRODYNAMIC PROPULSION,
by A. Sherman. Jan 63, 27p. incl. illus. 25 refs. (Rept. no. R63SD5)
(Contract AF 49(638)914)
Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Fluid flow, Acceleration, Electrodes, Pulse generators, Effectiveness, Propulsion, Plasma physics.

AD-295 745 Div. 9, 25
(TISTP/JW) OTS price $2.60

Naval Weapons Lab., Dahlgren, Va.
ROTATING FLOWS OF KARMAN-BODEWADT AND STAGNATION FLOWS,
by E. W. Schwiderski and Hans Lugt. 20 Dec 62, 25p. incl. illus. 6 refs. (NWL rept. no. 1836)
Unclassified report

DESCRIPTORS: *Boundary layer, Differential equations, Rotation, Velocity, Oscillation, Integrals, Fluid flow.

The rotating flows of von Karman and Bodewadt are re-examined on the basis of an extended boundary layer theory. It is found that the oscillating flow constructed by Bodewadt is due to underdetermined boundary data. A complete set of boundary data is defined for both problems in accordance with the practical flow models under consideration. The new solutions, which are defined as integrals of extended ordinary differential equations, eliminate the acknowledged discrepancies of the old solutions. Axisymmetric and plane stagnation flows with finite initial velocities, which are of significance for the design of piston machines, are constructed as special cases of von Karman's problem. (Author)

AD-295 777 Div. 9
(TISTP/JW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AERODYNAMIC COMPRESSION OF A GAS STREAM,
by Ye. D. Nesterov. 4 Jan 63, 14p. incl. illus. 3 refs. (Trans. no. FTD-TT-62-1555 from Izvestiya Vysshikh Uchebnykh Zavedeniy, Aviatsionnaya Tekhnika, no. 1, pp. 82-91, 1962)
Unclassified report

DESCRIPTORS: *Compressible flow, *Fluid flow, Translations, USSR, Nozzles, Atmospherics, Energy, Equations, Gases, Aerodynamic configurations.

The interaction of two streams of compressible fluid directed at an angle to one another is examined. The main stream of gas is compressed by an active stream which is supplied through

an annular slit located in the region of minimum cross section of the main stream. Ratios of aerodynamic compression are derived for two cases, a convergent channel and a Laval nozzle. The difference between these two cases is that in a divergent channel the separation zone is in communication with the atmosphere, and in a Laval nozzle it is a closed region. This gives unique conditions for solution of the problem. (Author)

AD-295 781 Div. 9, 13, 25, 27
(TISTE/OHD) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HEAT POWER ENGINEERING (SELECTED ARTICLES).
25 Jan 63, 34p. incl. illus. refs. (Trans. no. FTD-TT-62-1456 from Teploenergetika 10:5, pp. 35-38, 65-72, 1962)
Unclassified report

DESCRIPTORS: *Thermodynamics, *Power plants, Gas turbines, Simulation, Film boiling, Phase transitions, Turbulent flow, Convection, Heat transfer, Gas flow, USSR, Translations.

Three articles from Heat Power Engineering (USSR): (1) Similarity conditions of gas turbines are examined; similarity criteria for their work regimes on different working substances are proposed. (2) The measurement of the second critical loads during the boiling of a liquid is considered, the results of an experimental study are presented, and a method of calculating the stability of the film and bubble regimes of boiling is proposed. (3) A new method for generalizing the experimental data on convective heat transfer in the turbulent boundary layer of a gas is proposed. A universal law of heat transfer for the turbulent boundary layer of a compressed gas is derived.

AD-295 796 Div. 9
(TISTP/JW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE SOLENESS OF SOLUTION OF BASIC PROBLEM CONCERNING FREE THERMAL CONVECTION OF LIQUID,
by I. G. Sevruk..18 Jan 63, 6p. 2 refs. (Trans. no. FTD-TT-62-1613 from Izvestiya Vysshikh Uchebnykh Zavedeniy, Matematika (Kazan) No. 4, pp. 218-221, 1958)
Unclassified report

DESCRIPTORS: *Convection, *Heat, USSR, Translations, Viscosity, Liquids, Compressible flow.

AD-295 809 Div. 9, 1
(TISTA/VGW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE MIXING OF JETS IN A CHANNEL WITH VARIABLE CROSS-SECTION,
by O. V. Yakovlevskiy. 17 Jan 63, 14p. incl. illus. 7 refs. (Trans. no. FTD-TT-62-1571 from Izvestiya Akademii Nauk SSSR, OTN, Mekhanika i Mashinostroyeniye, No. 1, pp. 66-72, 1962)
Unclassified report

DESCRIPTORS: *Jet mixing flow, *Fluid flow, *Duct bends, Airplane engine ducts, Pipes, USSR, Mathematical analysis, Differential equations, Exhaust gas ejectors, Aerodynamics, Diffusers.

Currents occur in gas machines with non-uniform profiles of gas-dynamic parameters, e.g., velocity, this non-uniformity gradually smoothing out downstream. Similar flows are observed in the mixing chambers of ejectors and two-circuit jet engines. In some practical cases these flows occur in channels, the form of which differs from the cylindrical, i.e., in channels with variable cross-section. In planning such gas machines and apparatus it is necessary to know the laws of change in the non-uniformity of the stream along the flow-through section. The methods of calculating the parameters of a non-uniform stream in a channel of arbitrary shape have not, however, yet been established. There exists only the monograph of A. Ya. Cherkez on a theory devoted to flow in the cylindrical blending chamber of an ejector. In the present work an attempt is made to devise a method of calculating the flow of a fluid with non-uniform velocity distribution of the jet type in a channel with variable cross-section. (Author)

AD-295 828 Div. 9, 1, 12
(TISTA/VGW) OTS price $10.10

Foreign Tech Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AERODYNAMIC AND RADIATION HEATING DURING FLIGHT (Aerodinamicheskiy I Luchistyy Nagrev V Polete),
by I. I. Drakin. 11 Jan 63, 126p. incl. illus. tables, 56 refs. (Trans. no. FTD-TT-62-697 from Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Oborongiz, 93p., Moskva, 1961)
Unclassified report

DESCRIPTORS: *Supersonic flight, *Aerodynamic heating, Shielding, Shock waves, Heat transfer, Laminar boundary layer, Turbulent boundary layer, Conical bodies, Blunt bodies, Metal plates, Airfoils, Mathematical analysis, Radiation effects, USSR, Supersonics.

AD-295 833 Div. 9, 25
(TISTP/JW) OTS price $1.10

Brandeis U., Waltham, Mass.
(No title)
Final interim rept.,
by E. P. Gross. 1963, 3p. refs.
(Contract AF 49(638)27)
Unclassified report

DESCRIPTORS: *Helium, *Quantum mechanics, Gases, Hydrodynamics, Particles, Bibliography, Liquids, Kinetic theory.

Research concerns quantum theory of the many body problem with particular application to liquid helium, the interaction of nonrelativistic particles and quantum fields, and classical kinetic theory of gases. Of particular concern is liquid helium because it is one of the simplest many body systems and yet has an incredible richness of behavior. It may in time become the best understood many body system and serve as a prototype for other studies. The pattern of investigation is (1) an understanding of the qualitatively distinct possible ground states for a system of interacting bosons (gas, liquid, solid, etc.); (2) characterization of the possible excitations, i.e., phonon-roton spectrum, shear waves, vortices; (3) analysis of the effects of probes, i.e., x-rays, inelastic scattering of neutrons, foreign atom and ion behavior, etc.; (4) statistical thermodynamics; and (5) kinetics of interactions of excitations and the microscopic derivation of two fluid hydrodynamics. Work has been mainly on the first three topics. (Author)

AD-295 887 Div. 9, 25
(TISTP/JW) OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
THERMAL DIFFUSIVITY AND HEAT CAPACITY MEASURE-

MENTS AT LOW TEMPERATURES BY THE FLASH METHOD, by O. Makarounis and R. J. Jenkins. 19 Nov 62, 24p. incl. illus. 1 ref. (Rept. no. NRDL TR-599)
Unclassified report

DESCRIPTORS: *Thermal diffusion, *Heat, Aluminum alloys, Single crystals, Intensity, Temperature, Thermocouples, Oscilloscopes, Measurement, Surfaces.

A method for measuring heat capacity and thermal diffusivity of solid materials from -180 to +200 C is described. A high intensity short duration light pulse is absorbed in the front surface of the specimen and the resulting temperature rise of the rear surface is measured by a thermocouple, displayed on an oscilloscope and photographed by a Polaroid Land camera. From the shape and magnitude of the temperature traces thus obtained, the thermal diffusivity and heat capacity of the specimen are determined. Thermal properties of aluminum alloy No. 2024 and single crystal magnesium oxide were determined with this method over the temperature range from -180 to +200 C. (Author)

AD-295 992 Div. 9, 25, 15
(TISTW/JEA) OTS price $8.10

Douglas Aircraft Co., Inc., Santa Monica, Calif.
A CRITICAL STUDY OF THE DIRECT BLUNT BODY INTEGRAL METHOD,
by J. Xerikos and W. A. Anderson. 28 Dec 62, 80p. incl. illus. tables, 17 refs. (Rept. no. SM-42603)
Unclassified report

DESCRIPTORS: *Cylindrical bodies, *Ogives, *Gas flow, *Integration, Spheres, Supersonic flow, Shock waves, Axially-symmetric flow, Velocity, Pressure, Transonic flow, Statistical analysis, Sensitivity, Blunt bodies, Integral equations, Integrals, Hypersonics.

A representative formulation of the one strip blunt body integral method is treated in sufficient detail to delineate the numerical difficulties involved in its mechanization as well as to identify limitations in its application. While the integration of the governing system of equations for general body shapes comprises a two-point boundary value problem, the particular case of a flat-faced cylinder is shown to reduce to a procedure involving a single integration. An investigation is made of the extent to which conservation laws are satisfied throughout the shock layer region. Significant deviations are found to exist depending upon the method used for computing the distribution of flow properties across the shock layer. A procedure has been chosen which insures compatible tangential and normal flow property gradients at the shock and body while significantly reducing mass and momentum defects in most instances. Computed flow field data are presented for spheres and flat-faced cylinders. (Author)

AD-295 993 Div. 9
(TISTA/GEC) OTS price $1.60

Douglas Aircraft Co., Inc., Santa Monica, Calif.
PRESSURE DISTRIBUTION ON A WEDGE ACCELERATED IMPULSIVELY AT A SUPERSONIC MACH NUMBER,
by A. I. Ormsbee. 28 Dec 62, 15p. incl. illus. 5 refs. (Rept. no. SM-42649)
Unclassified report

DESCRIPTORS: *Wedges, Pressure, Load distribution, Aerodynamics, Partial differential equations, Series, Mathematical analysis, Acceleration, Theory, Supersonics.

10. FUELS AND COMBUSTION

AD-295 000 Div. 10, 25
(TISTM/SJR) OTS price $3.60

Rocketdyne, Canoga Park, Calif.
RESEARCH IN HYBRID COMBUSTION.
Quarterly progress rept. for period ending 31 Aug 62,
by M. V. Peck and T. Houser. 16 Jan 63, 28p. incl. illus. tables, 8 refs. (Rept. no. R-2267-8)
(Contract Nonr-301600)
Unclassified report

DESCRIPTORS: *Hybrid rocket propellants, *Solid rocket propellants, *Rocket oxidizers, *Reaction kinetics, Differential equations, Thermocouples, Thermal conductivity, Thermochemistry, Theory, Test equipment, Flames, Thermal diffusion, Turbulent flow, Boundary layer, Combustion, Hybrid rockets, Gaseous rocket propellants.

The radius vs time data taken at two oxygen flowrates were fitted by the empirical equation r = A + Bt(c). The instantaneous burning rate, r, is obtained by differentiation of this equation. The thermocouple measurements were described by the psuedo-steady-state heat conduction equation T = T sub S exp (-bx/k). A theoretical development from the von Karman fundamental equations for aerothermochemistry did not improve the theoretical model previously developed. (Author)

AD-295 084 Div. 10, 30
(TISTM/EJH) OTS price $2.60

Stanford Research Inst., Menlo Park, Calif.
SOLID PROPELLANT MECHANICAL PROPERTIES INVESTIGATIONS.
Quarterly progress rept. no. 2, 1 Sep-30 Nov 62, by Norman Fishman and James A. Rinde. 13 Dec 62, 23p. incl. illus. tables (Rept. no. 6)
(Contract AF 04(611)8388)
Unclassified report

DESCRIPTORS: *Solid rocket propellants, *Binders, *Polymers, Urethanes, Butadienes, Copolymerization, Carboxylic acids, Dilatometers, Quality control, Failure (Mechanics), Stresses, Test methods, Temperature, Loading, Volume, Mechanical properties.

Carboxy-terminated polybutadiene and polyurethane compositions for use in this program were prepared; sufficient quantities of bagged and unbagged end-bonded specimens are in desiccated storage. Instron quality-control test data for all batches of the polyurethane composition are tabulated; although these data do not provide good evidence for batch-to-batch reproducibility, volumetric swelling ratios show little difference among batches of each composition. The dilatometer was completed and is undergoing final evaluation and calibration. Preliminary measurements of volume change during extension at constant strain rate demonstrate adequate sensitivity and effective operation. Tests of desiccated end-bonded specimens at several constant strain rates and temperatures using the Instron were completed; ultimate property data on carboxy-terminated polybutadiene composition AFBA-1 are not particularly consistent and do not yield a well-defined failure envelope, except in the case of batch NF2/238. Some preliminary data are presented on constant load and constant loading rate tests. (Author)

AD-295 433 Div. 10
(TISTW/JEA) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE MECHANISM OF FLAME ACCELERATION IN THE TRANSITION FROM NORMAL BURNING TO DETONATION,
by L. N. Pyatnitskiy. 7 Dec 62, 10p. incl. illus. table, 10 refs. (Trans. no. FTD-TT-62-1441 from Doklady Akademii Nauk USSR, 144:6, pp. 1262-1265, 1962)
Unclassified report

DESCRIPTORS: *Flame propagation, *Turbulent boundary layer, Shock waves, Detonation, USSR, Ignition, Fuel consumption, Combustion, Combustion chamber gases, Turbulent flow, Acceleration, Detonation waves, Gases, Gas flow.

It is known that the transition from slow burning to detonation in gaseous fuel mixtures occurs during the process of accelerated flame propagation. According to existing theories, in normal propagation of the flame from the closed end of the tube, the expansion of the combustion products causes motion in the fresh mixture ahead of the flame front. This leads to turbulence of the mixture, an increase in the flame surface due to nonuniformity of the distribution of the flow velocity over the cross section, and acceleration of the flame. Accelerating progressively, the burning creates an adiabatic-compression wave. The latter, as the steepness of the flame front increases, produces a shock wave and then a detonation wave. Instead of dwelling on the phenomena which occur close to the place where the detonation arises, emphasis is placed upon processes on which the mechanism of the flame acceleration is based. (Author)

AD-295 635 Div. 10
(TISTM/SJR) OTS price $1.60

Phillips Petroleum Co., Bartlesville, Okla.
GAS TURBINE AND JET ENGINE FUELS.
Bimonthly progress rept. no. 4,
by W. L. Streets. 15 Jan 63, 9p. illus. 6 refs.
(Research Div. rept. no. 3375-62R)
(Contract N600(19)-58219)
Unclassified report

DESCRIPTORS: *Jet engine fuels, *Gas turbines, Chemical impurities, Guide vanes, Corrosion, Nickel alloys, Tensile properties, Sulfur compounds, Dioxides, Turbine blades, Combustion chamber liners, Failure (Mechanics), Oxides, Chromium compounds, Iron compounds, Catalysts, Sulfur, Fuels.

The fourth bimonthly period continued the study of the effects of sulfur in jet fuels on the durability of jet engine hot section components. The effort involved evaluation of the tensile strengths of Udimet 500, Waspalloy, Haynes Alloy 25, Hastelloy R-235 and Rene 41 simulated turbine inlet guide vanes following 12 hours exposure to sulfur-free exhaust gases at 2000F in the Phillips 2-Inch Research Combustor. Recent literature on the oxidation of SO2 to SO3 indicates that: (1) very little SO2 is converted to SO3 at temperatures typical of those existing in jet engine combustion and turbine sections, (2) the oxidation of SO2 to SO3 is catalyzed quite markedly by the oxides of chromium and iron, both of which are plentiful in jet engines - this is significant only below about 1700F, (3) significant conversion of SO2 to SO3 might occur in lower temperature zones such as tailpipes and (idle) afterburners, suggesting the possibility of greater sulfur attack on these components than on hot section components, and (4) sulfur corrosion of combustor liners and turbine blades would not appear to be attributable to SO3. (Author)

AD-295 791 Div. 10
(TISTM/EJH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE CHEMISTRY OF ORGANIC SULFUR COMPOUNDS CONTAINED IN PETROLEUMS AND PETROLEUM PRODUCTS (SELECTED ARTICLES).
25 Jan 62, 14p. incl. illus. tables (Trans. no. FTD-TT-62-1321 from Khimiya Seraorganicheskikh Soyedineniy Soderzhashchikhsya v Neftyakh i Nefteproduktakh, 4, pp. 100-102, 231-235, 1961, Gostoptekhizdat, Moskva)
Unclassified report

DESCRIPTORS: *Petroleum, *Petroleum industry, *Fuels, Impurities, Stability, Heat, Thiols, Corrosion, Purification, Processing, Production, Kerosene, Physical properties, Sulfur, USSR.

Contents:
Petroleums of the new oil sites in the Bashkir autonomous Soviet Socialist Republic
Thermal stability and corrosiveness of sulfur fuels at high temperatures

AD-295 808 Div. 10, 27
(TISTM/SJR) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE INFLUENCE OF THE PRODUCTS OF COMBUSTION OF SULFUR-CONTAINING FUEL DISTILLATES ON THE CONSTRUCTION MATERIALS OF GAS TURBINES,
by B. V. Losikov, A. D. Fat'yanov and others.
3 Dec 62, 14p. incl. illus. tables (Trans. no. FTD-TT-62-1026 from Energomashinostroyeniye, No. 2, pp. 34-37)
Unclassified report

DESCRIPTORS: *Gas turbines, *Combustion chamber gases, *Fuel oil, *Sulfur compounds, Exhaust gases, Sulfur compounds, Oxides, Gas turbine blades, Steel, Nickel alloys, Marine engines, Sea water, Chromium alloys, USSR, Fuels, Corrosion, Sulfur, Corrosion research.

11. GROUND TRANSPORTATION EQUIPMENT

AD-295 172 Div. 11, 33
(TISTA/FRL) OTS price $9.10

Arkwin Industries, Inc., Westbury, N. Y.
A STUDY ON FEASIBILITY AND METHOD OF IMPROVING FLOTATION FOR MOVING TYPES A2F, A4D, F4D, F4H, F8U-1 AND F8U-2 AIRCRAFT OVER UNPREPARED EXPEDITIONARY AIRFIELDS.
Final rept. on Phase 1,
by E. G. Gravenhorst. 2 Nov 62, 94p. incl. illus. tables, 12 refs.
(Contract NOm-72604)
Unclassified report

DESCRIPTORS: *Landing fields, *Aircraft, Tow bars, Tensile properties, Terrain, Landing gear, Aircraft tires, Trailers, Jet bombers, Attack bombers, Jet fighters, Design, Feasibility studies, Soils, Dollies.

The development of a method of moving aircraft over unprepared airfields involves study of various pertinent parameters and devices. This report consists of four basic sections. (1) A study of possible soil and ground conditions. It is concluded that this condition is one defined by parameters of a forward-area airfield (as described by the U. S. Army Waterways Experiment Station). (2) A study of all possible methods of accomplishment, concluding that a system of three inter-connected dollies is most feasible and adaptable. (3) The development of a dolly system, evolving the most efficient and applicable means. (4) An analysis of steering methods and towing forces. It is concluded that forces involved can be acceptable values for worst possible ground conditions. (Author)

12. GUIDED MISSILES

AD-295 100 Div. 12
(TISTA/GEC) OTS price $1.10

Northrop Space Labs., Hawthorne, Calif.
DESIGN CRITERIA FOR RADIATION RESISTANT FLIGHT CONTROL SYSTEMS FOR AEROSPACE VEHICLES.
Progress rept., 1-30 Apr 62.
30 Apr 62, 3p.
(Contract AF 33(657)7851)
Unclassified report

DESCRIPTORS: *Hypervelocity vehicles, *Satellite vehicles, Radiation damage, Solar flares, Protons, Particles, Penetration, Measurement, Space environmental conditions, Space flight, Design, Control systems, Radiation effects.

Study was continued on the determination of flight control system, definition of radiative environment, determination of radiation penetration through satellite walls, determination of radiation damage criteria, and determination of radiation effects of flight control systems. (Author)

AD-295 101 Div. 12
(TISTA/GEC) OTS price $1.10

Northrop Space Labs., Hawthorne, Calif.
DESIGN CRITERIA FOR RADIATION RESISTANT FLIGHT CONTROL SYSTEMS FOR AEROSPACE VEHICLES.
Progress rept., 1-31 May 62.
31 May 62, 5p.
(Contract AF 33(657)7851)
Unclassified report

DESCRIPTORS: *Hypervelocity vehicles, *Satellite vehicles, Radiation damage, Solar flares, Particles, Protons, Measurement, Space environmental conditions, Space flight, Design, Protons, Control systems, Radiation effects.

Study was continued on the determination of flight control systems, definition of radiative environment, determination of radiation penetration through satellite walls, determination of radiation damage criteria, and determination of radiation effects on flight control system. (Author)

AD-295 102 Div. 12
(TISTA/GEC) OTS price $1.10

Northrop Space Labs., Hawthorne, Calif.
DESIGN CRITERIA FOR RADIATION RESISTANT FLIGHT CONTROL SYSTEMS FOR AEROSPACE VEHICLES.
Progress rept., 1-30 June 62.
30 June 62, 4p.
(Contract AF 33(657)7851)
Unclassified report

DESCRIPTORS: *Hypervelocity vehicles, *Satellite vehicles, Radiation damage, Solar flares, Penetration, Measurement, Space environmental conditions, Space flight, Design, Protons, Control systems, Radiation effects.

Study was continued on determination of radiation penetration through satellite walls, determination radiation damage criteria, and determination of radiation effects on flight control systems. (Author)

AD-295 103 Div. 12
(TISTA/GEC) OTS price $1.10

Northrop Space Labs., Hawthorne, Calif.
DESIGN CRITERIA FOR RADIATION RESISTANT FLIGHT CONTROL SYSTEMS FOR AEROSPACE VEHICLES.
Progress rept., 1-31 July 62.
31 July 62, 4p.
(Contract AF 33(657)7851)
Unclassified report

DESCRIPTORS: *Hypervelocity vehicles, *Satellite vehicles, Radiation damage, Solar flares, Measurement, Space environmental conditions, Space flight, Design, Penetration, Protons, Control systems, Radiation effects.

Study continued on the definition of the radiative environment, determination of radiation penetration through satellite walls, determination of radiation damage criteria, radiation effects on the system, and test analysis. (Author)

AD-295 491 Div. 12, 25, 30
(TISTM/EJH) OTS price $2.25

General Electric Co., Philadelphia, Pa.
DYNAMIC BUCKLING OF SHELL STRUCTURES SUBJECT TO LONGITUDINAL IMPACT.
Final rept., May 61-June 62 on Structural Analysis Methods,
by A. P. Coppa and W. A. Nash. Dec 62, 77p. incl. illus. table, 16 refs. (Rept. no. TIS R62 SD77)
(Contract AF 33(616)8248, Proj. 1467)
(ASD TDR 62-774) Unclassified report

DESCRIPTORS: *Cylindrical bodies, *Conical bodies, *Structural shells, *Deformation, Impact shock, Theory, Stresses, Mathematical analysis, Loading, Pressure, Laboratory equipment, Aluminum alloys, Steel, Buckling.

Investigations dealing with the buckling of thin cylindrical and conical shells subject to axial impact are described. Studies consisted of experimental and theoretical efforts directed toward obtaining a qualitative and quantitative understanding of the dynamic buckling behavior of such shells under a variety of conditions. The conditions studied include different longitudinal conditions imposed on the impacted end of the shell and internal pressurization. In addition, methods of increasing the specific energy dissipation capacity of shells subject to axial impact were studied. Experimental evidence demonstrated that buckling of a cylindrical shell is initiated during the first passage of the axial compression stress wave due to the initial impact when the impact velocity is sufficiently high. Another significant experimental result showed that the asymmetrical (quasi-developable) form of shell buckling occurs as a result of

a smooth transition from the symmetrical (ring) form of buckling in some thin cylindrical shells subjected to an axially symmetric axial impact. Analytical results were obtained on the dynamical buckling behavior of cylindrical shells subject to a constant velocity end displacement showing both the upper critical stress and the number of circumferential waves increase and the time to initiate buckling decreases with increasing velocity of impact. (Author)

AD-295 597 Div. 12, 8
(TISTW/PCR) OTS price $1.10

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
APPLICATION OF ENCODERS IN MISSILE AZIMUTH ALIGNMENT SYSTEMS,
by F. J. Mooney. 31 Dec 62, 8p. (Rept. no. RG-TR-62-8)
(DA Proj. 1-B-2-79191-D-678)
Unclassified report

DESCRIPTORS: *Azimuth, *Coding, *Guided missiles (Tactical), Guided missiles (Surface to surface), Reliability, Guided missile launchers, Theodolites, Errors, Electronic equipment, Determination, Guided missile computers, Control.

The use of shaft angle encoders in missile azimuth alignment systems is discussed. A brief resume of the characteristics of several encoders is presented with a discussion of the use of incremental encoders as a step toward increased system reliability. (Author)

AD-295 606 Div. 12, 6, 15
(TISTA/VGW) OTS price $3.60

Naval Research Lab., Washington, D. C.
A THEORETICAL ERROR ANALYSIS OF THE U. S. NAVAL SPACE SURVEILLANCE SYSTEM.
Final rept.,
by W. B. Gordon and J. W. Wood. 4 Jan 63, 32p. incl. illus. table, 4 refs. (NRL rept. no. 5864)
Unclassified report

DESCRIPTORS: *Satellite vehicles, *Search radar, *Position finding, *Velocity, Orbital flight paths, Radar tracking, Statistical analysis, Partial differential equations, Errors.

a theoretical study is presented of the errors due to random noise to be expected in the measurements of satellite position, velocity, and other orbital parameters obtained by the U.S. Naval Space Surveillance System. Both phase and phase-rate data are considered with a view toward the following applications: (a) weighting data from satellite passes received at several stations to produce better estimates of both position and velocity, (b) improving first pass capability to determine orbital parameters, and (c) providing real-time designation data for tracking systems. Results are displayed as equal error contours on vertical plots of the Spasur fence for basic position and velocity components. (Author)

AD-295 642 Div. 12, 31
(TISTW/PCR) OTS price $3.60

Naval Weapons Lab., Dahlgren, Va.
TERRIER STRUCTURAL FIRING TEST ABOARD THE ITALIAN CRUISER GIUSEPPE GARIBALDI (C-551),
by P. P. Wiggins, T. I. Dodson, and J. A. Lamonica. 25 Jan 63, 1v. incl. illus. tables, 2 refs. (NWL rept. no. 1841)
Unclassified report

DESCRIPTORS: *Guided missiles (Surface to air), *Cruisers, *Blast, Flight testing, Launching, Italy, Tests, Test methods, Hazards, Pressure, Noise, Temperature, Toxicity, Exhaust gases, Test equipment, Microphones, Smokes, Booster rockets, Solid rocket propellants, Flames, Structures, Cameras, Photographs, Radomes, Gas leaks, Shipborne, Vulnerability.

Four TERRIER Mk 12 Mod 0 boosters with concrete slugs were fired aboard the Italian cruiser GIUSEPPE GARIBALDI (C-551) to investigate the adequacy of the protection for the TERRIER launching system personnel against blast effects and to determine the effects of the booster blast on the ship's structure. The test vehicles were fired at various angles such that the exhaust stream was directed at areas thought to impose the most severe conditions on the ship's structural components and equipment. Measurements were made of toxic gas concentrations, sound pressure levels, flame penetrations at door and port seals, and temperature changes inside the ship and in the blast area of the II TUGA Deck (02 level) and the I TUGA Deck (01 level). High-speed motion pictures were taken on all tests. The results indicated excessive smoke and gas leakage through the Port Blast Door, gas leakage through the ventilation intake system (II TUGA), and minor structural damage to equipment mounted on the side of the II TUGA deckhouse. (Author)

AD-295 671 Div. 12, 15, 6
(TISTW/PCR) OTS price $1.60

Space Technology Labs., Inc., Redondo Beach, Calif.
RELATIVISTIC CORRECTIONS TO DOPPLER MEASUREMENTS,
by Larry M. Noble. Nov 62, 12p. incl. illus. 4 refs. (Rept. no. 6120-J848-RU-000)
(Contract AF 04(694)1)
(BSD TDR 62-334) Unclassified report

DESCRIPTORS: *Doppler systems, *Rockets, *Frequency, Corrections, Mathematical analysis, Equations, Relativity theory, Velocity, Transformations.

Relativistic corrections to rocket velocity determinations from Doppler frequency measurements are investigated for several configurations specified by the Guidance Laboratory. The results are correct to order (v/c) squared if gravitational and atmospheric effects can be neglected. (Author)

AD-295 699 Div. 12, 13
(TISTW/JEA) OTS price $2.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
A STUDY ON REDUCING OF ELIMINATING AIR CONDITIONING IN THE PERSHING GUIDANCE AND CONTROL COMPARTMENT,
by Peter A. VanHoff and Russell T. Gambill. 15 Jan 63, 26p. incl. illus. table, 3 refs. (Rept. no. RG-TR-63-2)
Unclassified report

DESCRIPTORS: *Air conditioning equipment, *Temperature control, *Guided missiles (Tactical), Climatic factors, Temperature, Diurnal variations, Design, Tests, Test equipment, Instrumentation, Cooling, Guided missiles (Surface to surface), Solar energy, Labor, Costs, Inertial guidance, Costs.

A presentation is given on the possibility of removing or reducing the air conditioning now required by the PERSHING guidance and control

compartment is considered. A climatical study to establish the operational environment and a proposed laboratory test program to determine guidance and control compartment operating temperature are discussed. Also included are manpower and cost estimates for the proposed test program. A second report is under preparation which will detail a follow-on component evaluation based on the systems information obtained. (Author)

AD-295 740 Div. 12, 8
(TISTM/ODN) OTS price $1.10

Purdue U., Lafayette, Ind.
ADAPTIVE AND SELF-OPTIMIZING CONTROL.
Annual summary rept., 1 Feb 62-1 Feb 63,
by Rufus Oldenburger. 1 Feb 63, 3p.
(Contract Nonr-110020, Proj. NR 049-167)
Unclassified report

DESCRIPTORS: *Control systems, Feedback, Automatic, Signals.

It was shown that if an uncontrollable disturbance is followed by a sufficiently long controllable portion, and the disturbance is known in advance, there is one and only one best action of the controller that will yield a response optimum in every reasonable engineering sense, such as minimum time to equilibrium where the system error is zero, minimum area between the error curve and the time axis, minimum overswing, minimum underswing, etc. A controller is said to be near optimum if it yields approximately the same system response as if the disturbance were known in advance. It was also shown that the control function optimum for ramps normally yields nearly optimum response to an uncontrollable disturbance followed by a one or two segment piecewise linear controllable section. An effort is being made to extend the proof to an uncontrolled disturbance followed by a piecewise linear controllable section composed of an arbitrary number of straight line segments. The controller optimum for ramps essentially adapts itself to the rate of change of the disturbance. (Author)

AD-295 767 Div. 12, 2
(TISTA/VGW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE WAY TO MARS.
3 Jan 63, 5p. incl. illus. (Trans. no. FTD-TT-62-1921 from Russian Newspaper, Izvestiya, p-4, 16 Dec 1962)
Unclassified report

DESCRIPTORS: *Space flight, *Spaceships, Translations, Mars, USSR.

AD-295 799 Div. 12, 1
(TISTA/VGW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SPACE: USSR VS. USA,
16 Jan 63, 5p. (Trans. no. FTD-TT-63-43 from Vodnyy Transport, columns 1-6, p.3, 4 Aug 1962)
Unclassified report

DESCRIPTORS: *Space flight, USSR, Translations, Manned.

AD-295 800 Div. 12, 2, 9, 25
(TISTA/VGW) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE DOUBLE ELECTRICAL LAYER AT THE SURFACE OF A SATELLITE,
by M. A. Gintsburg. 2 Jan 63, 24p. incl. illus. 11 refs. (Trans. no. FTD-TT-62-1380 from Trudy, Institut Zemnogo Magnetizma Ionosfery i Rasprostraneniya Radiovoln i Ionosfera, AN SSSR Moskva, Issue 17(27) pp. 187-202, 1960)
Unclassified report

DESCRIPTORS: *Satellite vehicles, *Satellite vehicle trajectories, *Electric fields, Translations, USSR, Gas ionization, Boundary layer, Ionosphere, Mathematical analysis.

AD-295 829 Div. 12
(TISTW/PCR) OTS price $21.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
FUNDAMENTALS OF DESIGN FOR SOLID-PROPELLANT ROCKET MISSILES (Osnovy Proyektirovaniya Porokhovykh Raketnykh Snaryadov),
by V. D. Kurov and Yu. M. Dolzhanskiy. 1962, 394p. incl. illus. tables, 36 refs. (Trans. no. FTD-TT-62-1142 from Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Oborongiz, Moskva, pp. 1-294, 1961)
Unclassified report

DESCRIPTORS: *Guided missiles, *Rocket motors, *Guided missile warheads, *Artillery rockets, *Textbooks, Materials, Rocket heads, Rocket noses, High explosive ammunition, Configuration, Fragmentation ammunition, Shaped charges, Armor piercing ammunition, Interior ballistics, Exterior ballistics, Equations, Guided missile trajectories, Stabilization systems, Scattering, Tests, Rocket motor nozzles, Propellant grains, Aerodynamics, Flight testing, Thrust, Mathematical analysis, Solid rocket propellants, USSR. Design, Rocket trajectories.

AD-295 851 Div. 12, 16, 1
(TISTA/VGW) OTS price $4.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
BIOSATELLITE RECOVERY FROM CIRCULAR ORBITS,
by C. J. Swet. Oct 62, 38p. incl. illus. tables (Rept. no. CM-1026)
(Contract NOw 62-0604-c)
Unclassified report

DESCRIPTORS: *Orbital flight paths, *Satellite vehicles, *Satellite vehicle trajectories, Atmosphere entry, Tables, Biology, Recovery, Exterior ballistics, Deflection.

This report is a primer for the non-ballistician who is concerned with the design or selection of biospace experiments, to provide him with some feeling for the ballistics of biosatellite recovery. It presents in non-specialized terms some results of a recent parametric study of a wide variety of likely descent trajectories from near-earth orbits. Although these results were computed by approximate methods, they are believed to be sufficiently accurate for most planning purposes. No attempt is made to describe the computational methods or the underlying physics. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-295 095 Div. 13, 30
(TISTM/EJH) OTS price $8.10

Structural Mechanics Research Lab., U. of Texas, Austin.
EFFECTS OF SHAPE OF LOAD PULSE ON SHOCK-MITIGATING CHARACTERISTICS OF VERMICULITE CONCRETE AND A POLYURETHANE PLASTIC.
Final rept.,
by Ervin S. Perry, Eugene F. Smith and others.
13 July 62, 76p. incl. illus. tbles.
(Contract DA 49-146-xz-028)
(DASA 1299) Unclassified report

DESCRIPTORS: *Concrete, *Vibration isolators, *Blast, *Underground structures, Expanded plastics, Materials, Vermiculite, Polymers, Urethanes, Impact shock, Test equipment, Test methods, Stresses, Loading, Data processing systems.

Preliminary indications of the effects of load pulse on the shock-mitigating characteristics of lightweight vermiculite concrete and a polyurethane plastic are presented. Different input load pulses were obtained in tests on these materials using three different methods of dynamic testing. In the current study, a HYGE Shock Tester was used to provide the impact energy. The form of the characteristic acceleration-time curve from this study is compared with the form of those obtained in previously reported tests using air gun and drop tower facilities. Stress-strain curves obtained from the three different types of tests were found, in general, to be similar in some respects. Important differences were noted, however, and an attempt is made to explain them in terms of basic differences in the testing methods utilized. Reduction of the test data was facilitated by the use of both analog and digital computers. A brief description of the two methods of data reduction is given. Stress-strain curves from the two methods are compared to indicate their similarity. (Author)

AD-295 408 Div. 13
(TISTA/FRL) OTS price $8.00

Illinois U., Urbana.
AIR FORCE DESIGN MANUAL, PRINCIPLES AND PRACTICES FOR DESIGN OF HARDENED BTRUCTURES,
by N. M. Newmark and J. D. Haltiwanger. Dec 62, 638p. incl. illus. tables, 212 refs.
(Contract AF 29(601)2390, Proj. 1080)
(AFSWC TDR 62-138) Unclassified report

DESCRIPTORS: *Underground structures, *Nuclear weapons, Design, Structures, Air force research, Air blast, Ducts, Pressure, Shock waves, Blast, Load distribution, Motion, Construction, Reinforced concrete, Physical properties, Shelters, Mechanical properties, Failure (Mechanics), Beams, Mounting brackets, Ground support equipment, Radiation damage, Radiation effects, Theory, Hardening, Soils, Effectiveness.

This is the second edition of the Air Force Design Manual, Design of Protective Structures to Resist the Effects of Nuclear Weapons. Its intended use is for the planning and design of structures to resist the effects of nuclear weapons ranging into the megaton class. The emphasis is primarily on underground construction. The material presented is derived from existing knowledge and theory, so that the manual is also a report of the state-of-the-art. Starting with general considerations of site selection and structural function, various phases of design are considered: free-field phenomena in air and ground, material properties, failure criteria, architectural and mechanical features, radiation effects, surface openings, conversion of free-field phenomena to loads on structures, and the design and proportioning of structural elements and structures. (Author)

AD-295 432 Div. 13
(TISTW/RD) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
FEATURES OF BUILDING ROADS IN PERMA-FROZEN GROUND REGIONS,
by N. Puzakov. 14 Dec 62, 8p. (Trans. no. FTD-TT-62-1524 from Russian periodical, Avtomobil' nyye Dorogi, No. 1, pp. 27-28, 1962)
Unclassified report

DESCRIPTORS: *Roads, Soils, Freezing, Drainage, Construction, USSR, Arctic regions, Permafrost.

AD-295 472 Div. 13, 14
(TISTM/SJR) OTS price $9.10

Army Engineer Waterways Experiment Station, Vicksburg, Miss.
PREFABRICATED AIRFIELD AND ROAD SURFACING MEMBRANE INVESTIGATION; ENGINEERING TESTS, JANUARY 1956-DECEMBER 1959,
by S. G. Tucker. Oct 62, 110p. incl. illus. tables (Technical rept. no. 3-492; Rept. no. 2)
Unclassified report

DESCRIPTORS: *Roads, *Surfaces, *Landing mats, Textiles, Moistureproofing, Cotton mats, Coatings, Vinyl radicals, Polymers, Nylon, Synthetic rubber, Membranes, Pavements, Jet planes, Landing fields, Airplane landings.

Laboratory and field tests were conducted on four coated fabrics to determine their suitability (a) as dustproofing and waterproofing media when placed directly on soil subgrades, and (b) as an expedient means for dustproofing and waterproofing soil subgrades beneath the M8 steel landing mat. A vinyl-coated cotton duck membrane which had been tested previously was used as a basis for comparison. Nylon membranes tested were (a) a neoprene-coated nylon membrane; (b) a vinyl-coated nylon membrane, and (c) a neoprene-coated nylon membrane with embossed surface to improve skid resistance when wet. In the laboratory, the weight, tensile and tearing strengths, elongation, permeability, and resistance to flame, heat, fuel spillage, and weathering of membranes and/or adhesives were determined. In the field, adhesive-bonded and sewn membrane panels were placed on the subgrade with and without landing mat and subjected to accelerated traffic of a 50,000-lb single-wheel load to simulate aircraft traffic normally placed on a hastily prepared combat-type airfield or road. (Author)

AD-295 554 Div. 13, 2, 32
(TISTM/EJH) OTS price $10.10

Soil Stabilization Lab., Mass. Inst. of Tech., Cambridge.
SOIL STABILIZATION BY CHEMICAL METHODS.
Final rept., 22 Oct 60-21 Oct 61 on Phase 13.
Nov 61, 1v. incl. illus. tables, 5 refs.
(Contract DA 22-079-eng-288; Continuation of Contract DA 22-079-eng-171)
Unclassified report

DESCRIPTORS: *Soils, *Chemicals, Phosphates, Phosphorus compounds, Sulfuric acid, Additives, Amines, Calcium compounds, Oxides, Iron compounds, Clays, Aluminum compounds, Asphalt, Cements, Water, Semipermeability, Shear stresses, Stabilization.

Contents:
Soil stabilization with acidic phosphorus compounds
Soil stabilization with lime
Soil stabilization with asphalt emulsions
Soil stabilization with an iron-aluminum salt of phosphoric acid (TCB)
Evaluation of soil stabilizers
Effective stresses in stabilized soils
Theses completed in 1961

AD-295 596 Div. 13, 8
(TISTE/OHD) OTS price $7.60

American-Standard Corp., Union, N. J.
FINAL DESIGN AND CONSTRUCTION DETAILS FOR A 6000 BTU/HR. THERMOELECTRIC AIR CONDITIONER,
by D. H. Howling and R. S. Bevans. 31 Dec 61, 1v. incl. illus. tables (Rept. no. TR-24-61-1)
(Contract DA 44-009-eng-4643)
Unclassified report

DESCRIPTORS: *Air conditioning equipment, *Thermoelectricity, Heat exchangers, Design, Electrodes, Gas flow, Tin, Tin alloys, Bismuth, Bismuth alloys, Lead alloys, Antimony alloys, Aluminum alloys, Indium, Zinc alloys, Tellurides, Semiconductors, Diffusion, Resistance, Electroplating, Mathematical analysis, Cooling.

The design details of a 6000 Btu/hr thermoelectric air conditioner are presented. The performance specifications are summarized and the design calculations are also outlined. At design operating conditions, this air conditioner should produce 6000 Btu/hr of cooling with an over-all coefficient of performance of 0.44. The unit is equipped with a number of small blowers which circulate air over the fins attached to the cold thermoelectric junctions and a second set of blowers which circulate air over the fins attached to the hot thermoelectric junctions. The air conditioner weighs approximately 85 pounds and is designed to fit conveniently in the wall of the enclosure to be cooled. Satisfactory junctions were produced by electroplating the thermoelectric elements with nickel, capping the nickel with a lead-tin alloy and then oven soldering these pellets to the tinned base of the aluminum fin blocks with a solder wafer placed between the capped element and the tinned base. The electrical contact resistance of a single junction is of the order of one micro-ohm and the joint can withstand a tensile load of at least 50 lb/sq. cm. (Author)

14. MATERIALS (NON-METALLIC)

AD-294 977 Div. 14, 26
(TISTM/RGR) OTS price $4.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
INVESTIGATION OF ELECTRONIC MODULE POTTING RESINS;
by George R. Dallimore. Aug 62, 1v. incl. illus. tables, refs. (Rept. no. 3-35-62-6)
(Contract AF 04(647)787)
Unclassified report

DESCRIPTORS: *Electronic equipment, *Encapsulation, Coatings, Epoxy resins, Silicone resins, Resins, Polymers, Urethanes, Embedding substances, Test methods, Stresses, Packaging.

Five PAM amplifier modules were used as test vehicles in the evaluation of encapsulants and coatings. Three modules were encapsulated, respectively, in one of the following resins: Furane Plastics Epocast 202/9615 at 110 phr, Products Research PR 1538, and Emerson & Cumings Stycast 2651 MM. One module was freeze-coated in Dennis Chemical Co. Insulating Lacquer No. 1162 and then encapsulated in Epocast 202/9615; another module was freeze-coated in Dow Corning Adhesive 271 and then encapsulated in Stycast 2651 MM. The three resins were measured for shrinkage, insulation resistance, hardness, exotherm and strain. (Author)

AD-295 176 Div. 14, 16, 26
(TISTM/EJH) OTS price $1.60

Army Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D. C.
EVALUATION OF ADIPRENE L-100 URETHANE RUBBER AS A COSMETIC GLOVE MATERIAL,
by James C. Eaton, Jr. Jan 63, 11p. 4 refs.
(Technical rept. no. 6302)
(Proj. 6X59-01-001-04)
Unclassified report

DESCRIPTORS: *Elastomers, *Synthetic rubber, *Prosthetics, *Rubber gloves, Rubber, Polymers, Urethanes, Films, Manufacturing methods, Mechanical properties, Casting, Processing, Aging, Colors, Light, Radiation effects.

Urethane rubber Adiprene L-100 was evaluated, using a polyol cure system, as a possible cosmetic glove material. It was found to have excellent flexibility and elastic properties but poor stain resistance, and processing difficulties further impair its usefulness as a substitute for vinyl plastisols in glove manufacture. (Author)

AD-295 424 Div. 14
(TISTP/JW) OTS price $5.60

Aerojet-General Corp., Azusa, Calif.
STUDY OF THE EFFECTS OF THICKNESS ON THE PROPERTIES OF LAMINATES FOR UNDERWATER PRESSURE VESSELS.
Quarterly rept. no. 3, 1 Sep-30 Nov 62,
by R. D. Saunders and R. L. Smith. 11 Jan 63, 29p. illus. tables (Rept. no. 0623-01-3)
(Contract NObs-86406, Proj. SF-01-30503)
Unclassified report

DESCRIPTORS: *Pressure vessels, *Laminates, Plastics, Mechanical properties, Physical properties, Heat, Temperature, Resins, Reinforcing materials, Thermal stresses, Underwater, Thickness.

A discussion of the program and a summary of the work conducted is presented. The basic program is to study the effects of thickness on the mechanical and physical properties of fiber-reinforced plastic laminates for deep submersible external pressure vessels. An analysis of fabrication methods and problems related to thick-walled cylinders is given. Methods of testing and test results of cylinders and rings are presented. (Author)

Division 14 - MATERIALS (NON-METALLIC)

AD-295 551 Div. 14, 25
(TISTM/EJH) OTS price $1.00

Materials Research Corp., Orangeburg, N. Y.
THE ROLE OF THE GRAIN BOUNDARY IN THE DEFORMATION OF CERAMIC MATERIALS.
Summary rept., Mar 61-Mar 62,
by G. T. Murray, J. Silgailis, and A. J. Mountvala. Dec 62, 34p. incl. illus. tables, 9 refs.
(Contract AF 33(616)7961, Proj. 7350)
(ASD TDR 62-225) Unclassified report

DESCRIPTORS: *Ceramic materials, *Deformation, *Crystals, Refractory materials, Magnesium compounds, Oxides, Grains (Metallurgy), Shear stresses, Fracture (Mechanics), Creep, Rupture, High temperature research, Stresses.

The grain boundaries of MgO bicrystal specimens were subjected to creep-rupture tests in the temperature range of 1300-1500 C. and at shear stresses varying from 150 to 10,000 gm/sq. mm. The boundary was oriented at 45 degrees to the compression direction. The stress for grain boundary sliding and fracture varied markedly with crystal misorientation, high twist-low tilt boundaries being much weaker than other misorientations. For a given misorientation there was considerable scatter in the fracture and sliding stress data which was found to be a result of boundary irregularities (jog content) present in the as-received material or stress-induced during test. Most specimens did not exhibit controlled grain boundary sliding but, rather, would slide uncontrollably to fracture after an incubation period of a few minutes at a critical stress. (Author)

AD-295 577 Div. 14
(TISTM/ODN) OTS price $2.60

Goodrich, B. F., Co., Akron, Ohio.
STRUCTURAL FABRIC PROGRAM.
Interim technical progress rept. no. 6, 1 Oct-31 Dec 62,
by J. O. Miller and E. Bilsky. Dec 62, 16p. incl. illus. table.
(Contract AF 33(600)43036, Proj. 7-904)
(ASD TR 7-904, vol. 6)
Unclassified report

DESCRIPTORS: *Textiles, *Metallic textiles, Threads, Materials, Processing, Manufacturing methods, Industrial equipment, Stainless steel, Structures.

The purpose of this program, as related to aerospace application, is to provide a means of manufacturing large low-density AIRMAT structures made of metallic cloth and yarns capable of small volume packaging. The design and fabrication of the loom continued and design of the horizontal take-off mechanism was initiated. These efforts are directed toward the development of a loom procurement specification and the actual procurement of a loom capable of producing a low-density AIRMAT in the order of 20 feet wide with a maximum depth of 8 feet. (Author)

AD-295 623 Div. 14, 31
(TISTM/SJR) OTS price $2.60

Battelle Memorial Inst., Columbus, Ohio.
MECHANISM OF WATER ABSORPTION IN GLASS-REINFORCED PLASTICS.
Quarterly rept. no. 2, 1 Oct 62-1 Jan 63,
by D. W. McNeil, B. Bennett and R. I. Leininger. 1 Jan 63, 18p. illus. 21 refs.
(Contract NObs-86871, Proj. SR-007-03-04)
Unclassified report

DESCRIPTORS: *Filament wound construction, *Reinforcing materials, *Plastics, Composite materials, Test equipment, Test methods, Interferometers, Underwater, Water, Absorption, Deterioration, Submarines, Laminates, Glass textiles, Epoxy resins.

A detailed description of an interferometric method for measuring diffusivity is described. Preliminary data obtained from this device are presented and briefly compared with the results of long-term immersion studies on both cast resin and filament-wound cylinders. Moisture absorption in the former was observed to be a relatively constant phenomenon, while a more random data spread was observed in the filament-wound group. (Author)

AD-295 669 Div. 14, 25
(TISTW/PCR) OTS price $2.60

Servo Corp. of America, Hicksville, N. Y.
INVESTIGATION OF LONG WAVELENGTH INFRARED GLASSES.
Interim engineering rept. no. 3, 15 Oct 62-15 Jan 63,
by C. J. Billian. 31 Jan 63, 18p. incl. illus. tables.
(Contract AF 33(657)8560)
Unclassified report

DESCRIPTORS: *Infrared optical materials, *Glass, Absorption, Melting, Physical properties, Arsenic, Selenium, Germanium, Infrared transmitters, Tellurium, Optical analysis, Refractive index, Reflection, Coatings, Thermal expansion, Refractometers, Tables.

Information on the composition-property data obtained on glasses selected from the As-Se-Te field and on the investigation of new glasses with improved properties is presented. The program is divided into two parts. Part I is a property measurement section to determine certain optical, thermal, and physical properties on 20 different glass compositions. These glasses have been selected from a collection of proprietary glasses consisting of combinations of As, Se, and Te. The glasses have been melted and property measurements have been completed or are in progress. Part II consists of a composition study with the objective of developing new, improved glasses having transmittance to beyond 16 microns. This study uses the best glasses from Part I as a basis with substitutions of other elements in order to obtain additional glasses with improved infrared transmittance and greater thermal resistance (higher softening points). (Author)

AD-295 675 Div. 14
(TISTM/SJR) OTS price $2.60

Naval Supply Research and Development Facility, Bayonne, N. J.
THEORY AND DEVELOPMENT OF UNIVERSAL LEATHER TESTER AND SOLE LEATHER PERFORMANCE PARAMETERS,
by Milton Bailey and Gerald Schnabel. May 62, 15p. incl. illus. tables, 18 refs.
Unclassified report

DESCRIPTORS: *Leather, *Test equipment, *Test methods, Shoes, Abrasion, Acids, Water, Penetration, Deterioration.

New developments in sole leather technology have made it essential to develop realistic performance standards and subordinate the use of arbitrary physical and chemical limits. Accordingly, instrumentation was designed which enables abrasive evaluation of soles under dry

conditions, in water, and in acid or alkali media. The machine simultaneously tested water resistance and wet-abrasion resistance. Three performance parameters: dry abrasion, wet abrasion, and dynamic water resistance may be used to determine significant differences between sole leathers. (Author)

AD-295 803 Div. 14, 4, 26
(TISTM/EJH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DETERMINATION OF THE AMOUNT OF OXYGEN CONTAINED IN A LIQUID AT ATMOSPHERIC PRESSURE,
by A. D. Reshetnikova. 21 Jan 63, 12p. incl. illus. tables, 4 refs. (Trans. no. FTD-TT-62-1653 from Issledovaniye Nekotorikh Elementov Gidropneumoticheskogo Oborudovaniya Samoletov, pp. 140-147, Published by Oborongiz, 1961)
Unclassified report

DESCRIPTORS: *Hydraulic fluids, *Oils, *Solubility, *Oxygen, Hydraulic systems, Air, Gases, Pressure, Temperature, Physical chemistry, USSR, Theory, Manometers, Laboratory equipment.

AD-295 825 Div. 14
(TISTM/ODN) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A LABORATORY STUDY OF THE ANTIOXIDATION EFFECTIVENESS OF MOTOR-OIL ADDITIVES,
by K. S. Ramaya, M. S. Borovaya, and R. Kh. Sil's. 10 Jan 63, 9p. incl. illus. table (Trans. no. FTD-TT-62-1324 from Prisadki k Maslam i Toplivam, Gostoptekhizdat, Moscow, pp. 269-272, 1961)
Unclassified report

DESCRIPTORS: *Lubrication, *Lubricant additives, Lubricants, Absorption, Oxygen, Sulfonates, Stability, USSR, Oils, Antioxidants.

AD-295 847 Div. 14, 29
(TISTM/ODN) OTS price $1.25

Armour Research Foundation, Chicago, Ill.
RESEARCH ON FOG-RESISTANT MATERIALS FOR HIGH-ALTITUDE HELMET VISORS.
Final rept., 1 Mar 61-30 Apr 62 on Aerospace Systems Personnel Protection,
by Kurt Gutfreund. Dec 62, 42p. incl. illus. tables, 16 refs.
(Contract AF 33(616)8076, Proj. 6301)
(AMRL TDR 62-141) Unclassified report

DESCRIPTORS: *Helmets, *Antifogging agents, *Plastics, Films, Polymers, Hydroxides, Visibility, Vinyl radicals, Acetates, Optics, Transmission, Acrylic resins, Ultraviolet radiation, Nucleation, Moisture, Humidity, Wetting agents, Sodium compounds, Chlorides, Test equipment, Materials, Coatings.

AD-295 909 Div. 14, 4
(TISTM/EJH) OTS price $1.60

Wyandotte Chemicals Corp., Mich.
SYNTHESIS OF LOW TEMPERATURE OIL RESISTANT URETHANE ELASTOMERS.
Quarterly progress rept. no. 2, 1 Oct-31 Dec 62, by S. L. Axelrood and W. J. Lajiness. 1 Jan 63, 16p. incl. illus. tables.
(Contract DA 20-018-ORD-24883)
Unclassified report

DESCRIPTORS: *Elastomers, *Polymers, *Urethanes, *Urea, Anilines, Toluenes, Amines, Ethers, Propenes, Cyanates, Hydroxides, Isocyanic acids, Ethylenes, Oxides, Chlorides, Oils, Water, Absorption, Low temperature research, Mechanical properties, Elasticity, Synthesis.

AD-295 977 Div. 14, 4
(TISTM/SJR) OTS price $1.60

Stanford Research Inst., Menlo Park, Calif.
ACCELERATED DETERIORATION OF ELASTOMERS.
Quarterly progress rept. no. 2, 1 Nov 62-1 Feb 63,
by Frank R. Mayo, Kurt Egger and others.
8 Feb 63, 11p. illus. 11 refs.
(Contract DA 18-108-cml-7216)
Unclassified report

DESCRIPTORS: *Elastomers, *Polymers, Synthetic rubber, *Oxidation, Free radicals, Methyl radicals, Cyano radicals, Propyl radicals, Cadmium compounds, Rubber, Peroxides, Phenyl radicals, Hydrazines, Viscosity, Test equipment, Molecular weight, Octanoic acids, Cyclohexanes, Carboxylic acids, Polarographic analysis, Ketenes, Acetic anhydrides, Deterioration, Isoprene, Catalysts.

The degradation by oxygen at 50 degrees of a solution of synthetic polyisoprene in chlorobenzene was followed by changes in molecular weight and/or oxygen absorption. Soluble metal salts have various effects on the rates of oxidation but little or no effect on the number of chain breaks per molecule of oxygen reacting. Phenylhydrazine causes an abrupt decrease in viscosity, due partly to available free oxygen, partly to previously accumulated peroxides. p-Thiocresol causes sustained degradation at a moderate rate. Dimethylcadmium acts as a source of free radicals to initiate conventional oxidation chains. Small proportions of diketene and acetic anhydride have only slight effects on rates of oxidation. (Author)

15. MATHEMATICS

AD-294 916 Div. 15
(TISTW/JEA) OTS price $1.10

Colorado State U., Fort Collins.
APPROXIMATIONS USING ORTHOGONAL FUNCTIONS.
Final technical rept., 1 Jan-31 Dec 62,
by F. Max Stein. 31 Dec 62, 4p. 7 refs.
(Grant AF-AFOSR-62-219)
Unclassified report

DESCRIPTORS: *Functions, *Differential equations, *Integral equations, *Corrections, Transformations (Mathematics), Real variables, Bibliography, Theory, Mathematics.

The main portion of the time under the present grant was spent in examining Sturm-Liouville systems for possible functions to use in approximations using orthogonal functions. (Author)

Division 15 - MATHEMATICS

AD-294 914 Div. 15
(TISTW/JEA) OTS price $8.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
THRESHOLD LOGIC.
Master's thesis,
by Noel Stewart Alton. Dec 62, 88p. incl. illus. tables, 30 refs. (Rept. no. GE/EE/62-2)
Unclassified report

DESCRIPTORS: *Mathematical logic, *Special functions, *Linear programming, Machine translation, Theory, Design, Difference equations, Real variables, Electronics, Trigger circuits, Triggered gates, Switching circuits, Timing circuits, Convex sets, Transformations (Mathematics), Time signals, Algebras, Programming, Coding, Analysis, Processing, Computers.

Threshold logic is the body of fact, theory, and procedures pertaining to the properties and characteristics of threshold gates, threshold functions, and threshold gate networks. A brief but unified survey of the present state of the art is presented. Methods for accomplishing the logical analysis of both general threshold gate networks and symmetric threshold gate networks are developed. The effect of feedback on a simple threshold gate is analyzed; and a procedure for synthesizing an arbitrary Boolean function directly from its algebraic expression is given. A counter-example to a conjectured necessary and sufficient test for the realizability of a Boolean function is given. (Author)

AD-294 987 Div. 15
(TISTW/JEA) OTS price $2.60

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
OPERATORS WHICH GENERATE HARMONIC FUNCTIONS IN THREE-VARIABLES,
by R. P. Gilbert. Dec 62, 20p. 19 refs.
(Technical note BN-306)
(Grant AF AFOSR 62-454)
Unclassified report

DESCRIPTORS: *Operators (Mathematics), *Harmonic analysis, *Complex variables, *Operational calculus, *Potential theory, Calculus of variations, Integral transforms, Partial differential equations, Integrals, Integral equations, Transformations (Mathematics), Equations, Functions.

A new construction of the Bergman-Whittaker operator is presented. Another operator, which transforms functions of two complex variables into harmonic functions in three variables is introduced along with its inverse operator. A theorem connecting the singularities of analytic functions with those of harmonic functions is given with an illustration. These methods are extended to a class of singular hyperbolic equations. (Author)

AD-294 992 Div. 15, 25, 8
(TISTW/JEA) OTS price $1.60

Colorado U., Boulder.
THE USE OF STATISTICAL METHODS IN THE DETERMINATION OF THE PARAMETERS OF LINEAR MICROWAVE JUNCTIONS,
by S. W. Maley. 1 Sep 62, 15p. incl. illus. 5 refs. (Scientific rept. no. 5)
(Contract AF 19(604)4556, Proj. 4600)
(AFCRL 62-763) Unclassified report

DESCRIPTORS: *Statistical functions, *Complex numbers, *Feedback, *Microwave relay systems, *Microwave networks, *Transformations (Mathematics), Simultaneous equations, Determinants, Antenna amplifiers, X band, Mathematical analysis, Impedance, Impedance matching, Least squares method, Analysis, Antennas, Reflection, Special functions.

A linear network transforms quantities such as impedance, admittance, and reflection coefficient by a linear fractional transformation. A commonly occurring problem is the determination of the parameters of this transformation from measurements on the network. A number of methods of determining the parameters have been discussed in the literature. Most of these methods are graphical and have limitations on the accuracy obtainable with them. The method described makes use of statistical techniques to give values for the parameters which are the best, in the least squares sense, obtainable from the measured data. The use of a greater amount of measured data will reduce the probable error in the results. This is in contrast to most other methods in which greater accuracy can be obtained only by increasing the precision of the individual measurements. A particular application of this technique to microwave junctions is discussed. (Author)

AD-295 009 Div. 15
(TISTW/JEA) OTS price $1.60

Columbia U., New York.
THE LIMITING DISTRIBUTION OF THE VIRTUAL WAITING TIME AND THE QUEUE SIZE FOR A SINGLE-SERVER QUEUE WITH RECURRENT INPUT AND GENERAL SERVICE TIMES,
by Lajos Takacs. 2 Jan 63, 18p. 11 refs. (Rept. no. CU-33-62)
(Contract Nonr-26659, Proj. 042-205)
Unclassified report

DESCRIPTORS: *Job analysis, *Statistical distributions, *Transformations (Mathematics), *Distribution theory, Probability, Functions, Integrals, Calculus of variations, Integral equations, Production, Theory, Processing, Statistical functions, Statistical processes.

AD-295 048 Div. 15
(TISTW/JEA) OTS price $6.60

Hebrew U. (Israel).
RESEARCH IN THE AREA OF MATHEMATICAL ANALYSIS.
Technical rept. (Final) 1 Nov 58-30 Sep 59,
by S. Agmon, A. Dvoretsky and A. Robinson.
Oct 62, 64p. refs.
(Contract AF 61(052)187)
Unclassified report

DESCRIPTORS: *Mathematical analysis, *Special functions, Sequential analysis, Functions, Transformations (Mathematics), Series, Partial differential equations, Differential equations, Conformal mapping, Integral equations, Convex sets, Topology, Israel, Scientific research, Analysis.

AD-295 439 Div. 15
(TISTW/JEA) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
LIMIT THEOREMS FOR SUMS OF INDEPENDENT VARIABLES TAKING INTO ACCOUNT LARGE DEVIATIONS. II,
by Yu. V. Linnik. 14 Dec 62, 21p. 16 refs.
(Trans. no. FTD-TT-62-1148 from Teoriya Veroyatnostey i Yeye Primeneniya, 6, Issue 4, pp. 377-391, 1961)
Unclassified report

DESCRIPTORS: *Sequences, *Sequential analysis, Information theory, Probability, Fourier analysis, Transformations (Mathematics), USSR, Number theory.

AD-295 633 Div. 15
(TISTW/JEA) OTS price $4.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
ON THE MINIMAL SET OF COMPATIBLES FOR CLOSURE,
by William C. W. Mow. Oct 62, 36p. incl. tables, 2 refs. (Rept. no. PIBMRI-1084-62)
(Grant AFOSR-62-295)
Unclassified report

DESCRIPTORS: *Sequences, *Machine translation, *Coding, Transformations (Mathematics), Computers, Functional analysis, Tables, Linear programming, Processing, Switching circuits, Programming.

Given an incompletely specified sequential switching function in the form of a flow table, Paull and Unger had provided a systematic procedure for reducing the function into a set of maximum compatibles. A technique is presented here for selecting a minimal closed set of compatibles without the process of enumeration. The rules have been applied to numerous examples including those presented by Paull and Unger. (Author)

AD-295 705 Div. 15
(TISTW/JEA) OTS price $1.60

Mathematics Research Center, U. of Wisconsin, Madison.
IDEMPOTENTS IN GROUP ALGEBRAS,
by Walter Rudin. Nov 62, 8p. 3 refs. (MRC Technical summary rept. no. 361)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Groups (Mathematics), *Algebra, Algebras, Integral transforms, Complex numbers, Fourier analysis, Theory.

It is known that the idempotent elements in the complex group algebra of any commutative group have some rather striking properties. The present note exhibits simple examples of idempotents on non-commutative groups which fail to have these properties. (Author)

AD-295 706 Div. 15
(TISTW/JEA) OTS price $1.60

Mathematics Research Center, U. of Wisconsin, Madison.
CONJUGATE FUNCTIONS IN ORLICZ SPACES,
by Robert Ryan. Dec 62, 12p. 6 refs. (MRC technical summary rept. no. 367)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Conformal mapping, *Convex sets, Continuous media, Theory, Fourier analysis, Integrals, Curve fitting, Analysis, Special functions.

AD-295 707 Div. 15
(TISTW/JEA) OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
SOME THEOREMS CONCERNING SLOWLY VARYING FUNCTIONS,
by J. Karamata. Nov 62, 19p. 9 refs. (MRC Technical summary rept. no. 369)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Functions, *Transformations (Mathematics), Special functions, Integration, Integrals, Integral transforms, Potential theory, Theory, Analysis.

Conditions are given for $f(t)$ and the regularly varying function $\varphi(x) = x L(x)$, so that the asymptotic relation $\int_0^\infty f(t)\varphi(xt)dt \sim \varphi(x)\int_0^\infty f(t)t^\gamma dt$ holds true as $x \to \infty$, or as $x \to +0$. As a special case one obtains extensions of some results concerning the asymptotic behavior of the Laplace transform of regularly varying functions. (Author)

AD-295 708 Div. 15, 9
(TISTW/JEA) OTS price $1.60

Mathematics Research Center, U. of Wisconsin, Madison.
THE BOUNDARY LAYER FLOW OF A NON-NEWTONIAN FLUID NEAR A SPINNING CONE,
by Subhendu K. Datta. Nov 62, 13p. incl. illus. tables, 5 refs. (MRC Technical summary rept. no. 358)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Fluid flow, *Pressure, *Conical bodies, *Boundary layer, Fluid mechanics, Viscosity, Partial differential equations, Motion, Continuum mechanics, Tables, Analysis, Distribution, Spin, Continuous media.

AD-295 709 Div. 15
(TISTP/JEA) OTS price $3.60

Mathematics Research Center, U. of Wisconsin, Madison.
SOME RELATIONSHIPS BETWEEN BERS AND BELTRAMI SYSTEMS AND LINEAR ELLIPTIC SYSTEMS OF PARTIAL DIFFERENTIAL EQUATIONS,
by W. V. Caldwell. Dec 62, 30p. 9 refs.
(MRC Technical summary rept. no. 354)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Special functions, *Partial differential equations, Theory, Real variables, Matrix algebra, Matrix calculus, Analysis, Linear systems.

In the study of linear elliptic systems of first order partial differential equations in two independent variables, it has long been recognized that the Bers and Beltrami systems play a special role. A matrix representation of classes of pseudo-regular functions which form a real linear vector space is developed and used to further explore this role. (Author)

AD-295 710 Div. 15
(TISTW/JEA) OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
AN ALGORITHM FOR SINGULAR QUADRATIC PROGRAMMING,
by J. C. G. Boot. Nov 62, 23p. incl. illus. 1 ref. (MRC Technical summary rept. no. 353)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Linear programming, *Special functions, *Mathematical logic, Real variables, Transformations (Mathematics), Matrix algebra, Coding, Programming, Computers, Functional analysis, Machine translations, Algebras, Processing.

Research is presented on an algorithm for quadratic programming when the matrix of the quadratic part of the maximand is semi-definite. When m is the number of linear inequality constraints the algorithm leads to a simplex tableau of order m x 2m. In one section an algorithm is given which is valid when the

matrix of the quadratic part is strictly definite. The second section deals with linear programming, which is considered as a quadratic programming problem with a zero matrix for the quadratic part of the maximand. It is an introduction to the third section, which deals with singular quadratic programming. The algorithm solves explicitly for the dual problem as well. (Author)

AD-295 712 Div. 15
(TISTW/JEA) OTS price $1.60

Mathematics Research Center, U. of Wisconsin, Madison.
SHIFT INVARIANT LINEAR MANIFOLDS,
by P. M. Anselone. Dec 62, 8p. 5 refs. (MRC Technical summary rept. no. 359)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Differential equations, *Topology, *Functions, Complex numbers, Matrix algebra, Groups (Mathematics), Integral equations, Functional analysis, Theory.

A presentation is made on a characterization of solution manifolds of ordinary differential equations with constant coefficients as finite-dimensional shift invariant linear manifolds of continuous functions. (Author)

AD-295 713 Div. 15
(TISTW/JEA) OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
CONVERGENCE OF RECURRING SERIES WITH GENERAL-ORDER RECURRENCE RELATIONS,
by F. M. Arscott. Dec 62, 25p. 10 refs. (MRC Technical summary rept. no. 349)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Series, *Bessel functions, *Matrix algebra, *Difference equations, Differential equations, Algebras, Polynomials, Integrals, Special functions, Wave analysis, Real variables, Analysis, Theory.

The problem considered is that of determining the radius of convergence of the series $\sum_{0}^{\infty} u(r)x^r$, when the coefficients $u(r)$ are connected by a recurrence relation containing $(p + 1)$ terms. Apart from the trivial case $p = 1$, only the case $p = 2$ has hitherto been treated, using the method of continued fractions, which cannot be generalized to $p > 2$. A matrix technique is given, which is applicable to any value of p, whereby infinite products of $(p \times p)$ matrices are used to formulate characteristic equations and expressions for the $u(r)$. Particular attention is given to the situation in which the problem involves $(p - 1)$ variable parameters, whose values have to be determined in order to secure the greatest possible radius of convergence. (Author)

AD-295 714 Div. 15
(TISTW/JEA) OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
TWO-PARAMETER EIGENVALUE PROBLEMS IN DIFFERENTIAL EQUATIONS,
by Felix M. Arscott. Dec 62, 25p. 7 refs.
(MRC Technical summary rept. no. 350)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: *Integral equations, *Functions, *Differential equations, Integrals, Ellipsoids, Integration, Theory, Wave analysis, Partial differential equations, Analysis.

Formal properties of solutions (orthogonality, eigenfunction expansions) are established, and some results obtained on the real character of the eigenvalues. Two integral relations are given, leading to a reduction of the original problem to a one-parameter problem involving a nonlinear integral equation. (Author)

AD-295 749 Div. 15
(TISTP/MAK) OTS price $8.10

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
LINEAR ESTIMATION IN STOCHASTIC PROCESSES,
by A. George Carlton. Mar 62, 86p. 23 refs.
(Bumblebee rept. no. 311)
(Contract NOw 62-0604-c)
Unclassified report

DESCRIPTORS: *Mathematics, *Theory, Statistical analysis, Statistical distributions, Statistical functions, Statistical processes, Matrix algebra, Mathematical prediction, Sequential analysis, Functional analysis.

A general theory is developed for obtaining linear estimates, of minimum mean square error, of components of random processes. The fundamental requirement for applying the theory is that the process in question be vector Markov in the wide sense, a requirement typically satisfied exactly and almost invariably satisfied approximately. This estimation theory has considerable advantages over methods of functional analysis mentioned in Section II in that: (a) it is concerned with vector observation functions which may be time-dependent linear combinations of components of the process; (b) very general nonstationary processes are treated; (c) explicit solutions are obtained without difficulty; (d) linear prediction is an immediate consequence of linear estimation; and (e) estimates are obtained sequentially. In contrast to the typical approach of considering the observation as the sum of a quantity of interest together with disturbances the observation is considered a linear combination of components of a vector process, and the best linear estimate of a complete state vector of the sample process is obtained. (Author)

16. MEDICAL SCIENCES

AD-294 958 Div. 16
(TISTB/MD) OTS price $11.50

California U., Los Angeles, School of Medicine.
I. METHYLENEDIOXY-AMPHETAMINE HALLUCINOGENIC SERIES OF COMPOUNDS. II. CONDITIONED BEHAVIOR AND ELECTROENCEPHALOGRAPHIC TEST METHODS.
Final rept., 1 Apr 60-31 Dec 62,
by Gordon A. Alles and M. David Fairchild.
Dec 62, 1v. incl. illus. tables, refs.
(Contract DA 18-108-405-cml-735)
Unclassified report

DESCRIPTORS: *Hallucinogens, Test methods, Benzedrine sulfate, Mescaline, Man, Electroencephalography, Cats, Stimulation, Electrical potential, Toxicity, Mice, Conditioned reflex, Test equipment, Alkoxy radicals, Phenyl radicals, Propyl radicals, Amines, Dioxides, Methanes, Pharmacology.

The main objective of the investigations was to discover methods employing experimental animals in which the central nervous system activity of a series of compounds having closely similar chemical structure could be quantitatively analyzed so that the results would indicate some degree of empirical correlation to the hallucinogenic properties of these agents in man. The four amphetamine derivatives, 3,4,5-trimethoxy amphetamine (TMA); 3,4-methylenedioxy amphetamine (MDA); 3,4-dimethoxy amphetamine (DMA); 3,4-methylenedioxy-5-methoxy amphetamine (MMDA); amphetamine; and mescaline were compared by three experimental procedures. Studies on the transcallosal evoked potential in the brain of the anesthetized cat failed to show any positive correlation to the human experience. The ability of the test compounds to disrupt a conditioned avoidance response in mice had some relationship to hallucinogenic potency in man. The final test was the quantification of a distinctive electrical wave form elicited by the test compounds in the central nervous system of unanesthetized and essentially unrestrained cats. The closest empirical relationships to the hallucinogenic potency of the test compounds in man were found employing this procedure.

AD-294 974 Div. 16
(TISTB/MS) OTS price $1.60

Hazleton Labs., Inc., Falls Church, Va.
MEASUREMENT OF 17-HYDROXYCORTICOSTEROIDS IN URINE. DEVELOPMENT OF A METHOD FOR THE MEASUREMENT OF PREGNANEDIOL IN URINE.
Annual progress rept., 1 Feb 62-31 Jan 63,
by Edward A. Garlock and Mary Ann Hurley.
31 Jan 63, 11p. incl. illus. tables, 13 refs.
(Contract DA 49-193-md-2318)
Unclassified report

DESCRIPTORS: *Corticosteroids, *Pregnandiols, Biochemistry, Urine, Chromatographic analysis.

The progress of the development of a method for the analysis of urinary pregnanediol is described. The urine is subjected to enzymic hydrolysis and solvent extraction; and the pregnanediol is measured by gas-liquid chromatography. (Author)

AD-294 997 Div. 16
(TISTB/MD) OTS price $2.60

Stanford U., Calif.
NEURAMINIC ACID AND CENTRAL NERVOUS SYSTEM FUNCTION (NEURAMINIC ACID IN THE BRAIN AND TISSUES OF VARIOUS ANIMALS).
Final rept.,
by Noreen Eldredge, Windsor Cutting and George Read. 1962, 12p. illus. tables, 21 refs.
(Contract AF 49(638)714, Proj. 9777)
(AFOSR-2897) Unclassified report

DESCRIPTORS: *Neuraminic acids, Determination, Brain, Man, Cattle, Swine, Rats, Mice, Chickens, Turtles, Reptiles, Arthropods, Frogs, Fishes, Mollusca, Mussels, Snails, Echinoderms, Tissues (Biology), Acetyl radicals, Hydroxides, Nervous system.

A comparative study of the sialic acid concentration of the brains and tissues of various animals was made in order to determine whether differences were present which could be correlated with the phylogenetic level of the nervous system. Sialic acid, probably in the form of N-acetylneuraminic acid (NANA) was present in chordate brains in both the ganglioside, G, and lipid-free residue, R. For G the range was 300-600 mg.% of the total lipids and for R, 350-600 mg.% of the total lipid-free residue. There were no differences which could be correlated with the phylogenetic level of the nervous system. In animals with diffuse nervous systems whole tissues were analyzed and compared to whole mouse tissue. In whole mouse, sea urchins, and clams the R and G fractions were similar and contained both NANA and N-glycoylneuraminic acid, NGNA. In snails the R fraction contained NANA, NGNA and an unidentified spot with the color characteristics of shikimic and quinic acids. The G fraction contained no NANA. Chitons and sea anenomes were similar; the G fraction contained both NANA and NGNA while NANA was missing in the R fraction. All the whole tissues except the sea urchin contained unidentified spots in addition to the NANA and NGNA. (Author)

AD-295 028 Div. 16
(TISTB/MD) OTS price $2.60

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
BODY TEMPERATURE AND CARBOHYDRATE VALUES IN NORMAL AND ENDOTOXIN POISONED MICE EXPOSED TO LOWERED ENVIRONMENTAL TEMPERATURES,
by John E. DeTurck and L. Joe Berry. Aug 62, 25p. incl. illus. tables, 67 refs. (Rept. no. AAL TDR 62-4)
(In cooperation with Bryn Mawr Coll. Pa., Contract AF 41(657)340, Proj. 8241-32)
Unclassified report

DESCRIPTORS: *Body temperature, *Bacterial toxins, *Exposure, *Carbohydrates, Glycogen, Muscles, Liver, Mice, Starvation, Survival, Determination, Stress (Physiology), Hypothermia, Metabolism.

A comparison is made between the rectal and the body surface temperatures of fed mice housed in individual compartments without bedding while exposed continuously to environmental temperatures of 5, 15, and 25C. Surface temperatures of the mice are related to the ambient temperatures at which they are held. Rectal temperatures are known to undergo cyclic variations and, except for the first 24 hours at 5 C, are within normal limits throughout a week of exposure. Fasted animals at 5 C cannot maintain a core temperature beyond about 6 to 12 hours and all die within 24 hours. Injection of an LD50 dose of endotoxin fails to depress liver and muscle glycogen and total body carbohydrate after three hours at 15 C, but after an exposure of five hours liver glycogen alone remained unchanged. At 5 C, carbohydrate reserves were depleted in liver, muscle and total body after three hours in fasted mice but not in fed mice. After five hours, muscle glycogen alone was lowered. Endotoxin poisoned mice lost carbohydrates after three hours and five hours at both 5 C and 15 C. (Author)

AD-295 091 Div. 16
(TISTB/DGH) OTS price $1.10

Army Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D. C.
COLOR PRESCRIPTION FORM FOR COSMETIC GLOVES,
by Joseph E. Ouellette. Jan 63, 7p. incl. illus. (Technical rept. no. 6301)
(Proj. 6X59-01-001-04)
Unclassified report

DESCRIPTORS: *Gloves, Hands, Anthropometry, Theory, Acceptability, Colors, Prosthetics.

Division 16 - MEDICAL SCIENCES

A technique is described for achieving more custom-like coloring of cosmetic gloves. The method involves the use of a color prescription form which can be used to describe in greater detail the characteristics of those portions of the human hand of greater cosmetic significance. (Author)

AD-295 127 Div. 16, 25, 2
(TISTA/VGW) OTS price $1.10

RAND Corp., Santa Monica, Calif.
RADIATION ENVIRONMENT FOR MANNED SPACECRAFT,
by S. H. Dole. 1963, 7p. 4 refs. (Rept. no. P-2691)
Unclassified report

Presented at a meeting of the Institute of Environmental Science, Hotel Statler, 18 Apr 63, Los Angeles, Calif.

DESCRIPTORS: *Space flight, *Spacecraft, Sun, Galaxies, Cosmic rays, Electromagnetic waves, Ultraviolet radiation, Light, Infrared radiation, Van Allen radiation belt, Solar flares, Protons, Shielding, Orbital flight paths, Radiation hazards, Space environmental conditions.

The various kinds of radiation in space are treated from the viewpoint of their significance to different kinds of space missions, here classified as low earth orbits, high earth orbits, lunar missions and interplanetary missions. These are differentiated from one another by characteristic differences in the radiation environment and also in the choice of tactics available for the avoidance of extreme levels of radiation. The kinds of radiation that are discussed include: electromagnetic radiation from the sun including ultraviolet light, visible light and infrared light; the so-called Van Allen belt radiation, or electrons and protons trapped in the earth's magnetic field; high-energy protons originating spasmodically in large solar flares; and cosmic particles of galatic origin. (Author)

AD-295 142 Div. 16, 12, 32
(TISTA/VGW) OTS price $1.10

Martin-Marietta Corp., Denver, Colo.
A BIBLIOGRAPHY ON WEIGHTLESSNESS,
comp. by Eleanor RePass. 1962, 5p. 73 refs. (Literature search no. 23)
Unclassified report

DESCRIPTORS: *Weightlessness, *Bibliography, Space medicine, Space flight, Stress (Physiology).

AD-295 175 Div. 16, 14
(TISTM/EJH) OTS price $1.10

Army Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D. C.
MATERIALS EVALUATION FOR A PORTABLE ENCLOSURE,
by Carl A. Nielson. Dec 62, 8p. (Technical rept. no. 6226)
(Proj. 6X59-01-001-04)
Unclassified report

DESCRIPTORS: *Plastics, *Medical equipment, Contamination, Surgery, Tents, Polymers, Ethylenes, Fluorides, Esters, Portable shelters, Vinyl radicals, Propenes, Cellulose acetates, Mechanical properties, Noise, Materials.

Commerically available plastic films were obtained and tested qualitatively for properties that are desired in a surgical tent material. In general, it was found that thin films of inherently rigid materials illustrated good steam autoclaving characteristics but poor noise attributes. The noise obtained was of the crinkling and crackling variety. The inherently soft materials, on the other hand, did not present any noise problem but showed very poor autoclaving characteristics. Of all the films tested, no one film appeared to have a balance of properties suitable for the application. (Author)

AD-295 434 Div. 16
(TISTB/DGH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CLINICAL ASPECTS OF BOTULISM,
by K. V. Bunin and N. I. Rashba. 17 Dec 62, 10p. 7 refs. (Trans. no. FTD-TT-62-1773 from Sovetskaya Meditsina, No. 8, pp. 80-84, 1962)
Unclassified report

DESCRIPTORS: *Botulism, USSR, Diagnosis.

The patients treated were of considerable interest in regard to the characteristics of the course of botulism, its epidemiology, and treatment. The present work describes the characteristics which were detected. In addition, it is considered necessary to remind doctors of this disease since practice shows that it is frequently forgotten, and as a consequence of this an untimely diagnosis is made. (Author)

AD-295 462 Div. 16
(TISTB/MD) OTS price $8.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PROSERINE, ESERINE, AND DIBAZOL AND THEIR ADMINISTRATION IN NEUROPATHOLOGY (SELECTED CHAPTERS),
by N. N. Anosov and M. A. Rozin. 19 Dec 62, 84p. incl. illus. tables (Trans. no. FTD-TT-62-1303 from Prozerin, Ezerin, Dibazol i Ikh Primenenie v Nevropatologii, Library of Practical Medicine, Medgiz, Leningrad, pp. 7-33, 50-81, 102-108, 177-196, 1956)
Unclassified report

DESCRIPTORS: *Prostigmine, *Physostigmine, *Nervous system, *Autonomic nervous system, Man, Strychnine, Thiamine, Caffeine, Acetylcholines, Epinephrine, Quinolines, Benzimidazoles, Pathology, Therapy, Conditioned reflex, Benzedrine sulfate, Inhibition, Cholinesterase, Muscles, Circulatory system, Blood pressure, Neuromuscular transmission, Physiology, Brain, Motor reactions, Laboratory animals, Pharmacology, Drugs.

Contents:
General pharmacological characteristics of proserine, eserine and dibazol
Effect of proserine, eserine, and dibazol on the inhibitory process
Mechanism of action (primary pharmacologic reaction) of proserine, eserine, and dibazol
The effect of proserine, dibazol, and certain other substances on the efficiency of healthy persons
Treatment of diseases with probable disorders of the myoneural junctions
Treatment of progressive muscular dystrophy
Diseases not affected by anticholinesterase preparations and dibazol. Prospects for treating these diseases

AD-295 590 Div. 16
(TISTB/MD) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
EXTRACTION APPARATUS FOR DETERMINATION OF TOTAL

SERUM LIPIDS,
by Dale A. Clark and Carrie B. Haven. Nov 62, 4p. incl. illus. table, 4 refs. (Rept. no. SAM TDR 62-136)
Unclassified report

DESCRIPTORS: *Lipids, *Serum, *Blood chemistry, Animal extracts, Solvent extraction, Chloroform, Methanols, Separation, Determination, Test equipment.

Two designs of glassware useful in measurement of total lipids in serum are described. One permits expulsion of the upper phase but increases requirements for solvent volumes. The other, a modified Erlenmeyer flask, facilitates withdrawal of the lower phase. Chilling the flask for 5 to 10 minutes in a refrigerator or deep freeze shortens the time required for separation of the two phases. Analyses of seven samples by each of three methods in triplicate showed that the modified flask gives results that average 3% higher than results by another method, but precision of both methods is the same. By using only 0.5 ml. of serum, the standard deviation of the results by either method is 2%. (Author)

AD-295 603 Div. 16
(TISTB/DGH) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
THE EFFECT OF DECREASED BAROMETRIC PRESSURE ON OXYGEN CONSUMPTION,
by Louis F. Johnson, Jr., J. Ryan Neville, and Richard W. Bancroft. Sep 62, 6p. incl. illus. tables, 7 refs. (Rept. no. SAM TDR 62-94) (Proj. 7758)
Unclassified report

DESCRIPTORS: *Oxygen consumption, *Barometric pressure, Metabolism, Nitrogen, Low pressure research, High altitude.

There have been conflicting reports in the literature concerning the effect of decreased barometric pressure on oxygen consumption. Some reports citing the resting oxygen consumption of 8 healthy men was measured at ground level, at 18,000 feet pressure altitude, and at 30,000 feet pressure altitude. There was no change in oxygen consumption with change in pressure altitude. The findings were discussed from three aspects: (1) the work of breathing at low barometric pressures; (2) the methodology for measuring oxygen consumption; and (3) a possible decreased nitrogen effect. (Author)

AD-295 661 Div. 16
(TISTB/DGH) OTS price $1.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
PREDICTION OF SPEECH DISCRIMINATION SCORES FROM OTHER TEST INFORMATION,
by Lois L. Elliott. Dec 62, 13p. incl. tables, 4 refs. (Rept. no. SAM TDR 62-145)
Unclassified report

DESCRIPTORS: *Speech, Verbal behavior, Diversity reception, Auditory perception, Mathematical prediction, Tests, Audiometry.

This study attempted to predict speech discrimination scores by using other audiometric test information. For two samples tested with Rush Hughes materials and one sample tested with W-22 materials, PB score in the nontest ear and difference between SRT's in the test and nontest ears were the two best predictors of PB scores. The estimating equation (Rush Hughes) developed on these samples was applied to groups with normal hearing (very poor prediction) and mixed losses (moderately good prediction). Application of the equations to cross-validation samples indicated high validity coefficients for the W-22 equation, but only moderate validity coefficients for the RH equation. Results suggest that the predictive contribution of PB score in the nontest ear includes the effect of non-measured variables such as subject's verbal aptitude, motivation, difference between speaker's and listener's dialects, etc. (Author)

AD-295 722 Div. 16
(TISTB/DGH) OTS price $1.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
VENTILATION OF THE NORMAL AND BLOCKED MIDDLE EAR. A REVIEW OF MECHANISMS,
by Richard A. Davison. Nov 62, 17p. incl. illus. 28 refs. (Review 7-62)
Unclassified report

DESCRIPTORS: *Ear, Aviation medicine, Preventive medicine, Aviation deafness, Theory, Ventilation.

AD-295 730 Div. 16
(TISTB/MD) OTS price $1.60

Kent State U., Ohio.
THE STIMULATING EFFECT OF HEXAMETHONIUM BROMIDE ON PHYSICAL PERFORMANCE.
Progress rept.,
by Charles G. Wilber and David Gardner.
1 Jan 63, 5p. incl. illus. table, 6 refs.
(Contract DA 49-193-md-2216)
Unclassified report

DESCRIPTORS: *Pharmacology, Mice, Stimulation, Exercise, Effectiveness, Swimming, Survival, Quaternary amines.

White, male, albino mice were used to test the effect of hexamethonium bromide on physical performance. The forced swimming test was the measure of physical performance. Doses less than about 42 mg/kg resulted in improved physical performance as indicated by swimming times which were as high as almost 700 percent of control. Doses above 42 mg/kg resulted in decreased swimming times. The possible mechanism of the effect is discussed. (Author)

AD-295 768 Div. 16, 12, 1
(TISTA/VGW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
BEFORE THE LEAP TO THE STARS,
by A. Golikov and I. Kas'yan. 21 Dec 62, 7p. (Trans. no. FTD-TT-62-1767 from Ogonek, No. 34, pp. 4-5, Aug 1962)
Unclassified report

DESCRIPTORS: *Space medicine, *Space environmental conditions, Feeding, Weightlessness, Gravity, Translations, USSR, Simulation.

AD-295 771 Div. 16
(TISTB/MD) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CLINICAL FEATURES AND TREATMENT OF BRUCELLOSIS

OF THE GOAT-SHEEP TYPE IN THE STAGE OF FOCAL LESIONS,
by L. V. Yarovoy. 28 Dec 62, 14p. incl. tables, 11 refs. (Trans. no. FTD-TT-62-1774 from Sovetskaya Meditsina, No. 8, pp. 72-78, 1962)
Unclassified report

DESCRIPTORS: *Brucellosis, Man, Nervous system, Joints (Physiology), Muscles, Allergy, Therapy, Bacterial vaccines, Antibiotics, Streptomycins, Chemotherapeutic agents, Analgesics, Fever, Diagnosis, Pathology, Body temperature, USSR.

AD-295 774 Div. 16
(TISTB/MD) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CLINICAL ASPECTS, DIAGNOSIS, AND TREATMENT OF GOAT-SHEEP TYPE BRUCELLOSIS IN THE GENERALIZATION STAGE OF INFECTION WITH FOCAL LESIONS,
by L. V. Yarovoy. 2 Jan 63, 15p. incl. tables, 3 refs. (Trans. no. FTD-TT-62-1772 from Sovetskaya Meditsina, No. 3, pp. 58-65, 1962)
Unclassified report

DESCRIPTORS: *Brucellosis, Man, Bacterial vaccines, Antibiotics, Streptomycins, Chemotherapeutic agents, Fever, Sources, Diagnosis, Pathology, Body temperature, USSR.

AD-295 778 Div. 16
(TISTB/DGH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
COSMOS - EARTH,
by V. V. Parin. 21 Jan 63, 7p. (Trans. no. FTD-TT-62-1609 from Ogonek, No. 17, pp. 26-27, 1961)
Unclassified report

DESCRIPTORS: *Space flight, *USSR, Acceptability, Effectiveness, Biology, Scientific research, Space medicine.

AD-295 780 Div. 16, 12, 1
(TISTA/VGW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HOW THE FLIGHT WAS READIED,
by V. V. Parin. 18 Jan 63, 6p. (Trans. no. FTD-TT-62-1608 from Zdorov'ye, No. 6, pp. 4-5, 1961)
Unclassified report

DESCRIPTORS: *Space flight, *Space medicine, *Stress (Physiology), Translations, Manned, USSR.

AD-295 782 Div. 16
(TISTB/DGH) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HERALD OF THE ACADEMY OF SCIENCES OF THE USSR (SELECTED ARTICLES).
31 Jan 63, 33p. (Trans. no. FTD-TT-62-1164 from Vestnik Akademii Meditsinskikh Nauk SSSR, No. 4, pp. 44-50, 65-70, 76-81, 1962)
Unclassified report

DESCRIPTORS: *Industrial medicine, *Antibodies, *Acceleration tolerance, Fatigue (Physiology), Stress (Physiology), Phagocytosis, Space medicine, Immunology, Industry, Hazards, Air, Contamination, USSR, Genetics, Weightlessness.

AD-295 783 Div. 16, 2, 1
(TISTA/VGW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MAN AND THE COSMOS,
by V. V. Parin. 16 Jan 63, 4p. (Trans. no. FTD-TT-62-1605 from Sovetskaya Litva, p. 4, 31 Mar 61)
Unclassified report

DESCRIPTORS: *Space flight, Manned, Biology, Translations, USSR.

Flights of Soviet satellites and rockets have demonstrated that soviet scientists and engineers have solved a number of difficult problems connected with the mastering of cosmic space. Safe descent of a number of soviet cosmic ships at the predesignated region strengthens the belief that the time is not too far away when man's first flight into the cosmos will be executed. The extensive program of biological investigations, carried out by soviet scientists on cosmic ships, yielded enormous scientific material, the analysis of which has not been fully completed. (Author)

AD-295 784 Div. 16
(TISTB/MD) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INTERNATIONAL SCIENTIFIC LIFE PROGRAM OF INVESTIGATING CARDIO-VASCULAR DISEASES,
by V. V. Parin. 16 Jan 63, 8p. (Trans. no. FTD-TT-62-1611 from Vestnik Akademii Meditsinskikh Nauk SSSR, No. 3, pp. 48-50, 1961)
Unclassified report

DESCRIPTORS: *Circulatory system, Pathology, USSR, Conferences.

A lecture is presented about a group sent to Geneva to participate in the functions of the scientific delegation in setting up a program of investigation in the field of cardiovascular diseases (Scientific group on a Research Program in Cardiovascular Diseases) of All World Health Preservation Organization. (Author)

AD-295 789 Div. 16
(TISTB/MS) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INTERNATIONAL SCIENTIFIC LIFE ACHIEVEMENTS OF MEDICINAL ELECTRONICS,
by Ye. B. Babskiy and V. V. Parin. 6 Jan 63, 16p. (Trans. no. FTD-TT-62-1612 from Vestnik Akademii Meditsinskikh Nauk SSSR, No. 5, pp. 88-93, 1961)
Unclassified report

DESCRIPTORS: *Medical equipment, Cybernetics, Medicine, Prosthetics, Radiobiology, X rays, USSR, Electronics.

AD-295 798 Div. 16
(TISTB/MD) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE COSMONAUT IS FEELING FINE, SAID A SOVIET SCIENTIST,
by V. V. Parin. 17 Jan 63, 4p. (Trans. no. FTD-TT-62-1602 from Russian Newspaper, Literaturnaya Gazeta, 1p., 15 Aug 1961)
Unclassified report

DESCRIPTORS: *Space flight, Space medicine, Physiology, Deceleration, Weightlessness, Man, Stress (Physiology), USSR.

AD-295 801 Div. 16
(TISTB/DGH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
COSMOS, MEDICINE, MAN,
by V. V. Parin. 17 Jan 63, 5p. (Trans. no. FTD-TT-62-1603 from Komosomol'skaya Pravda, 1p. 10 March 1961)
Unclassified report

DESCRIPTORS: *Space probes, *USSR, Dogs, Positioning reactions, Effectiveness, Space medicine.

Four questions were directed to prof. active member of the Academy of Medical Sciences USSR, V. V. Parin as follows: (1) What is the characteristic trait of cosmic investigations, carried out in our country? (2) Has the analysis of data obtained during the flight of the second ship-satellite been completed? Tell us, what new facts have these investigations given to medicine? (3) What is the effect of cosmic flight conditions on the higher nervous activity? (4) Why are dogs employed preferably in the role of experimental animals in cosmic investigations? (Author)

AD-295 805 Div. 16
(TISTB/MD) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.,
IT HAS BEEN ACCOMPLISHED,
by V. V. Parin. 18 Jan 63, 9p. (Trans. no. FTD-TT-62-1607 from Smena, No. 7, pp. 3-4, 1961)
Unclassified report

DESCRIPTORS: *Astronautics, Space flight, Man, Dogs, Mice, Bacteria, USSR.

AD-295 806 Div. 16, 12, 30
(TISTA/VGW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MAN IN COSMOS,
by V. V. Parin. 17 Jan 63, 10p. (Trans. no. FTD-TT-62-1606 from Smena, No. 13, pp. 22-23, 1961)
Unclassified report

DESCRIPTORS: *Space flight, *Space medicine, Space environmental conditions, Weightlessness, Gravity, Van Allen radiation belt, Cosmic rays, Radiation hazards, Hypothermia, Sleep, USSR.

AD-295 807 Div. 16
(TISTB/DGH) OTS price $9.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RADIOBIOLOGY (SELECTED CHAPTERS),
by David Emmanuilovich Grozdenskiy. 23 Jan 63, 118p. incl. illus. tables (Trans. no. FTD-TT-62-355 from Radiobiologiya, Biologicheskoye Deystviye Ioniziruyushchikh Izlucheniy, Gosudarstvennoye Izdatel'stvo Literatury v Oblasti Atomnoy Nauki i Tekhniki, Moskva (Atomizdat) pp. 20-120, 1961)
Unclassified report

DESCRIPTORS: *Radiobiology, *Radiochemistry, *Radiation effects, *Radiation injuries, Oxygen, Plants, Animals, Therapy, Radiological dosage, Metabolism, Radioactivity, Man, Embryos, Cancer, Leukemia, USSR, Water, Cells (Biology), Preventive medicine.

AD-295 815 Div. 16
(TISTB/DGH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CLINICAL COURSE AND CERTAIN PROBLEMS OF DIFFERENTIAL DIAGNOSIS OF Q FEVER,
by L. D. Knyazeva and Ye. S. Yefimova. 12 Dec 62, 14p. 11 refs. (Trans. no. FTD-TT-62-1771 from Sovetskaya Meditsina, No. 2, pp. 75-81, 1962)
Unclassified report

DESCRIPTORS: *Q fever, Antigens, Rickettsia, Dosage, Medical examination, Identification, USSR, Diagnosis.

AD-295 823 Div. 16
(TISTB/MD) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
REACTIONS OF AN ORGANISM OCCURRING DURING MASSIVE GAMMA-IRRADIATION,
by A. F. Bibikova, V. Ye. Busygin and others. 5 Dec 62, 14p. incl. illus. 11 refs. (Trans. no. FTD-TT-62-1689 from Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya, 6:4, pp. 57-62)
Unclassified report

DESCRIPTORS: *Radiation effects, *Gamma rays, Rabbits, Brain, Blood circulation, Body temperature, Nerves, Nervous system, Electrocardiography, Respiratory system, Blood forming organs, Biochemistry, Electroencephalography, Blood pressure, Electrical properties, Pathology, Histology, Hematology, Blood platelets, Erythrocytes, Physiology.

AD-295 827 Div. 16, 8
(TISTB/MS) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
COSMIC BIOTELEMETRY,
by N. Agadzhanyan and I. Akulinichev. 18 Jan 63, 8p. incl. illus. table (Trans. no. FTD-TT-62-1908 from Russian Periodical, Tekhnika Molodezhi, No. 9, pp. 25-26, 1962)
Unclassified report

DESCRIPTORS: *Space medicine, *Medical equipment, Cybernetics, USSR, Telemetering, Remote control systems.

AD-295 864 Div. 16, 20
(TISTP/JW) OTS price $12.00

USAF Radiation Lab., U. of Chicago, Ill.
(No title).
Quarterly progress rept. no. 46.
15 Jan 63, 158p. incl. illus. tables, refs.
(Contract AF 41(609)1693)
Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Radiation effects, *Radiation injuries, Toxicity, Digestive system, Life expectancy, Biochemistry, Radiation tolerance, Gamma rays, Neutrons, Mammals, Laboratory animals.

Contents:
The influence of X-irradiation on the reductase activity of the livers of rats
Influence of X-irradiation and a nitrogen mustard on the development of a thiophosphate-oxidizing

enzyme system in the livers of young male rats
The influence of various chemical compounds on radiation-induced changes in enzyme activities in certain rat tissues
Modification and dosimetry of the plutonium-beryllium neutron irradiation facility
Effect of dose rate on life span shortening of mice exposed to chronic low level fast neutron irradiation.
Studies on the toxicity of rare earth compounds and their influence on radiation lethality
Histology findings in the blood vessels of rats and mice exposed to acute and chronic x-irradiation while fed various synthetic high fat diets
The influence of various chemical compounds on radiation lethality in mice
Further studies on the mechanism of radioprotection afforded by cyanide and various nitriles
Radioprotective effects in proton-irradiated mice pretreated with chemical protectors

AD-295 899 Div. 16
(TISTB/MS) OTS price $1.60

Army Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D. C.
HAND MECHANISM VOLUNTARY OPENING w/SINGLE POSITION STOP,
by T. J. Bushey. Jan 63, 10p. incl. illus.
(Technical rept. no. 6221)
(Proj. 6X59-01-001-04)
Unclassified report

DESCRIPTORS: *Artificial limbs, *Hands, *Mechanics, Operation, Prosthetics, Design, Motion, Control, Positioning reactions.

The design, development and evaluation of a voluntary opening hand mechanism with a single position stop for upper extremity amputees. (Author)

17. METALLURGY

AD-294 953 Div. 17, 26, 1
(TISTM/SJR) OTS price $1.00

Northrop Corp., Hawthorne, Calif.
DEVELOPMENT OF IMPROVED METHODS, PROCESSES, AND TECHNIQUES FOR PRODUCING STEEL EXTRUSIONS.
Interim engineering rept. no. 14, 1 Oct-31 Dec 62,
by L. M. Christensen. 31 Dec 62, 31p. incl. illus. (Rept. no. NOR-63-9)
(Contract AF 33(600)36713)
Unclassified report

DESCRIPTORS: *Steel, *Processing, Airframes, Mechanical properties, Tool steel, Molybdenum alloys, Induction heating, Austenite, Martensite, Ferrites, Thickness, Heat treatment, Deformation, Dies, Drawing (Machine processing), Extrusion.

The loss of load carrying capability in the point and shoulder area of drawn sections is critical when working with thicknesses of .05 and less. Sections of .06 thickness and larger are not appreciably affected because the few thousandths of an inch removed per side for the point is a progressively smaller percent of the load carrying cross section. To make it possible to obtain repetitively successful results preliminary draw dies should be designed without restraint at the extremities. Edges should be sized as a final step in the series of reductions. The best prospect for eliminating deficiencies of point reliability to PH15-7MO is by transforming the metallurgical structure of the point and shoulder area from austenite to martensite. This will increase the strength level in the area of smaller cross section without affecting deformation characteristics of the shape to be drawn. Steel extrusion of the target configuration can be adequately and satisfactorily stretch straightened without resorting to application of heat during the stretching operation. Chevron type defects which occurred on both H-11 and PH15-7MO are caused by lubrication failures which are often associated with metal pileup and resultant uneven draw forces. (Author)

AD-294 983 Div. 17
(TISTM/EJH) OTS price $1.60

Climax Molybdenum Co. of Michigan, Detroit.
THE DEVELOPMENT AND EVALUATION OF TUNGSTEN-BASE ALLOYS.
Quarterly rept. no. 3, 15 Sep-15 Dec 62,
by Gordon D. McArdle, Robert Q. Barr and M. Semchyshen. 15 Dec 62, 9p. incl. illus. tables.
(Contract NOw 62-0419-c)
Unclassified report

DESCRIPTORS: *Tungsten alloys, Niobium alloys, Hafnium alloys, Zirconium alloys, Molybdenum alloys, Carbon alloys, Boron alloys, Mechanical properties, Hardness, Crystallization, Casting, High temperature research, Electric arcs, Vacuum furnaces, Rods, Extrusion.

Seven 4-in dia. vacuum-arc-cast tungsten-base alloy ingots were successfully extruded following canning in molybdenum and were swaged to 1/2-in dia. bar stock. Recovery data are reported. Recrystallization temperature determinations were conducted on the extruded billets, as well as on the swaged bar stock. (Author)

AD-294 990 Div. 17
(TISTM/EJH) OTS price $1.10

Aerojet-General Corp., Azusa, Calif.
INVESTIGATION OF STRESS-CORROSION CRACKING OF HIGH-STRENGTH ALLOYS.
Informal progress rept. no. 20, 1-30 Nov 62, 24 Jan 63, 3p. tables (Rept. no. L0414-01-20)
(Contract DA 04-495-ORD-3069)
Unclassified report

DESCRIPTORS: *Rocket motor cases, *Steel, *Titanium alloys, Aluminum alloys, Vanadium alloys, Nickel alloys, Stresses, Coatings, Failure (Mechanics), Fracture (Mechanics), Corrosion, Mechanical properties, Chemical properties, Alloys.

Bent-beam and center-notched specimens of 6Al-4V titanium are under test. Both the annealed and the quenched-and-aged conditions are being evaluated. No cracking has been observed to date. Chemical and mechanical property data are included for 6Al-4V-Ti base alloy and 20%- and 18%-Ni maraging steel. (Author)

AD-295 027 Div. 17, 14
(TISTM/EJH) OTS price $12.00

Aerospace Corp., El Segundo, Calif.
RE-ENTRY PROTECTIVE SYSTEMS. A BIBLIOGRAPHY OF REFRACTORY METALS PROTECTIVE SYSTEMS RESEARCH,
by D. H. Leeds. 6 Aug 62, 157p. (Rept. no. TDR-169(3240-31)TR-1)
(Contract AF 04(695)169)
(DCAS TDR 62-146) Unclassified report

DESCRIPTORS: *Refractory coatings, *Refractory materials, *Bibliography, Re-entry vehicles, Space environmental conditions, Molybdenum, Molybdenum alloys, Niobium, Niobium alloys, Tungsten, Tungsten alloys, Tantalum, Tantalum alloys, Heat resistant alloys, Physical properties, High temperature research, Manufacturing methods, Thermodynamics, Thermal radiation.

The purpose of this bibliography is twofold: to direct research in the field of refractory metals protective coatings away from present silicide approaches and into systems capable of protection over 3500F, and to familiarize the materials engineer with past and current research in his field (including the valuable examples set by silicide protection theory), thereby enabling him to interpret his own science for the designer. Through such an exchange it should become apparent to the designer that refractory metal alloy development and protective coating development are interdependent. The emphasis of the bibliography is upon research performed on the protection of refractory metals from unfavorable environments at elevated temperatures. The four major systems covered are: molybdenum (739 references); columbium (226 references); tungsten (219 references); and tantalum (828 references). Also included is a brief introductory section which stresses the need for research on coatings for refractory metals at hypersonic environments. (Author)

AD-295 069 Div. 17
(TISTM/SJR) OTS price $1.10

National Technical U. (Greece).
CREEP CHARACTERISTICS OF TENSION MEMBERS IN HIGH TEMPERATURES BY USING THE PHOTO-SCREEN METHOD.

Division 17 - METALLURGY

Final technical rept., 1 Nov 61-31 Oct 62,
by Pericles S. Theocaris. 31 Oct 62, 4p.
(Contract DA 91-591-EUC-2021; Continuation of Contract DA 91-591-EUC-1632)
Unclassified report

DESCRIPTORS: *Steel, *Plasticity, Measurement, Photographic analysis, Thickness, Interferometers, Test equipment, Test methods, Tensile properties, Mechanical properties, Stresses, High temperature research, Copper, Aluminum alloys, Creep, Deformation.

The photo-screen method was applied to two main problems: (a) the study of material characteristics of common and special steels at room temperature and at their plastic region of deformation, and (b) the study of creep characteristics of various industrial metals and alloys at high temperatures. The first problem is an interesting application of the method developed for the study of plastic characteristics of materials at room temperature. Series of specimens made of Steel DIN.St.37 and the American Special Steel U.S.S.T.1 were studied and important results obtained for the strain distribution. Meanwhile, the preparation of the specimens made of copper, duraluminium and steel for the study of the creep comportment of these materials at higher temperatures is in progress. (Author)

AD-295 109 Div. 17, 25
(TISTM/EJH) OTS price $4.60

Denver Research Inst., Colo.
INVESTIGATION OF THE CHARACTERISTICS OF INTERMETALLIC COMPOUNDS AS THERMIONIC EMITTERS.
Annual technical summary rept. no. 1, 1 Nov 61-31 Oct 62,
by C. B. Magee, M. J. Pool and others.
31 Dec 62, 43p. incl. illus. tables (Rept. no. DRI 2079)
(Contract Nonr-336101, Proj. NR 099-362)
Unclassified report

DESCRIPTORS: *Intermetallic compounds, *Beryllium alloys, *Zirconium alloys, *Niobium alloys, *Thermionic emission, Vaporization, Heat of sublimation, Enthalpy, Thermodynamics, Diodes, Laboratory equipment, Cesium, Vapors, Thermoelectricity, Vacuum apparatus.

Equipment was designed and fabricated for the determination of evaporation rates of intermetallic compounds by means of the Langmuir free evaporation technique. Evaporation rate data were obtained in the temperature range from 900 to 1200 C for metallic Be and for ZrBe13, NbBe12, and Nb2Be17. Assuming the evaporating species to be monatomic Be, vapor pressures were calculated from evaporation rates and Van't Hoff plots were made. The standard enthalpies of sublimation, in kilocalories per gram atom Be determined from these plots are: for Be, 79.0; for ZrBe13, 85.0; for NbBe12, 19.9 and 59.5; and for Nb2Be17, 98.0 and 55.8. That there are two enthalpies of sublimation for the Nb beryllides may be due to the existence of a heretofore unknown beryllide intermediate in Be content between Nb2Be17 and NbBe3. Possibly both NbBe12 and Nb2Be17 decompose upon evaporation to the intermediate species which decomposes to NbBe3. A high-vacuum diode for the determinating thermionic emission parameters of intermetallic compounds was designed and constructed. A second diode with improvements over the first design is being constructed.

AD-295 427 Div. 17, 14
(TISTM/EJH) OTS price $5.60

Battelle Memorial Inst., Columbus, Ohio.
DEFENSE METALS INFORMATION CENTER SELECTED ACCESSIONS,
comp. by Patricia B. Plate. Dec 62, 44p.
(Contract AF 33(616)7747, Proj. 2(8-8975))
Unclassified report

DESCRIPTORS: *Metals, *Alloys, *Refractory materials, *Bibliography, Manufacturing methods, Heat resistant alloys, Refractory coatings, Rocket cases, Aircraft, Non-destructive testing, Filament wound construction, Ablation, Thermal insulation, Buoyant materials, Composite materials, Glass textiles, Design, Materials.

The DMIC Selected Accessions is a current listing of selected documents and journal articles in an abstracted form on subjects within the technical scope of the Defense Metals Information Center (DMIC). It does not include restricted documents received by DMIC, such as Government classified reports, many of the progress reports issued to Government agencies, or company proprietary reports. It is published to supply current information and to provide an awareness of technical-information sources to Government contractors and subcontractors. (Author)

AD-295 440 Div. 17, 26
(TISTM/ODN) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DEFORMABLE ALUMINUM ALLOYS (SELECTED ARTICLES).
31 Dec 62, 23p. incl. illus. tables, refs.
(Trans. no. FTD-TT-62-1272 from Deformiruyemyye Alyuminiyevyye Splave, Oborongiz, Sbornik Statey, Moskva, pp. 131-136, 189-194, 195-199, 1961)
Unclassified report

DESCRIPTORS: *Aluminum alloys, Thermal stresses, Forging, Fracture (Mechanics), Physical properties, Tensile properties, Elasticity, Deformation, Magnesium alloys, Castings, USSR, Additives, Heat treatment.

Contents:
Features of the thermal treatment of heavy forgings of D1 alloy
Hot cracking of alloys of the V95 type
Some features of obtaining ingots from the alloys AMg5V and AMg6.

AD-295 452 Div. 17
(TISTM/ODN) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A MAGNETIZABLE CERAMIC FLUX,
by V. P. Zvyagintsev. 10 Jan 63, 3p. (Trans. no. FTD-TT-62-1439 from Soviet Patent No. 144564 (733724/25), 7 June 1961)
Unclassified report

DESCRIPTORS: *Welding fluxes, *Ceramic materials, Fluorspar, Ferromagnetic materials, Silicon, Titanium, Manganese, Iron, Powder metals, Quartz, Marble, Materials, Ceramic materials.

A magnetizable ceramic flux of the following composition was prepared: electrode marble 34-38%, fluorspar 20-24%, ferromanganese 4-5%, ferrosilicon 5-&%, iron powder 18-22%, water glass 15%, quartz 7-9%, and ferrotitanium 7-9%. (Author)

AD-295 475 Div. 17, 14
(TISTM/SJR) OTS price $.75

Metals and Ceramics Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
VAPOR PLATING OF ALUMINUM ON STEEL.
Final rept.
Aug 60-Aug 62 on Finishes and Materials Preservation,
by Jesse J. Crosby. Dec 62, 21p. incl. illus. tables, 4 refs.
(Proj. 7312)
(ASD TDR 62-907) Unclassified report

DESCRIPTORS: *Steel, *Vapor plating, *Aluminum coatings, *Metallurgy, Aluminum compounds, Butyl radicals, Metalorganic compounds, Adhesion, Copper, Magnesium, Titanium, Stainless steel, Glass, Graphite, Corrosion inhibition, Processing, Thin films.

Adherent coatings of aluminum were deposited on low carbon steel specimens by vapor (gas) plating using the metal-organic compound triisobutyl aluminum. In the process liquid triisobutyl aluminum was mixed with isobutylene and argon, vaporized, then thermally decomposed at a heated steel specimen into metallic aluminum plus volatile decomposition effluents. As a result of this reaction the aluminum was deposited on the steel substrate and the volatile decomposition was swept out the exhaust. Uniform, ductile coatings, 2 mils thick, were obtained. The capability of obtaining thicker deposits was indicated. Significantly, the deposition of aluminum by vapor plating was not limited to mild steel or metal substrates in general. Other materials including copper, magnesium, titanium, stainless steel, glass, and graphite were also plated by this process. (Author)

AD-295 556 Div. 17, 20
(TISTM/BRW) OTS price $11.00

Pittsburgh U., Pa.
DEFECT PRODUCTION, INTERNAL FRICTION, AND YOUNG'S MODULUS IN DEUTERON IRRADIATED TUNGSTEN.
Master's thesis,
by Daniel R. Muss. Dec 61, 136p. incl. illus. refs. (Scientific rept. no. 1)
(Contract AF 19(604)3906, Proj. 5620)
(AFCRL 62-515) Unclassified report

DESCRIPTORS: *Tungsten, Mechanical properties, Internal friction, Neutron bombardment, Lattices, Theses, Radiation damage.

Contents:
Defect production
Experimental procedure
The energy dependence of radiation damage in tungsten
Effects of radiation on the mechanical properties of tungsten
Vibration of a cantilevered rod
The relaxation process
Low temperature vacuum tight seals for Al foil to Cu
Effect of an RIC filter on the transient signal
Correction for the energy loss in the sample

AD-295 584 Div. 17
(TISTM/ODN) OTS price $.50

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
EXPLORATION OF NEW METHODS FOR PREVENTING GALVANIC CORROSION BETWEEN MAGNESIUM AND STEEL.
by Donald K. Stelling. 8 Jan 63, 10p. incl. tables, 5 refs. (Rept. no. CCL-136)
(DA Proj. 593-32-007)
Unclassified report

DESCRIPTORS: *Steel, *Magnesium, Corrosion, Electrolysis, Tests, Phosphates, Salts, Sprays, Sea water, Films, Failure (Mechanics), Sodium compounds, Corrosion inhibition.

An investigation was conducted to explore new methods of treating magnesium-steel couples after the two metals had been assembled and placed in electrical contact with each other. A phosphate anodizing treatment, prepared with this objective in mind, proved to be ineffective when applied to such couples. The treatment seemed to offer considerable corrosion resistance to magnesium alone when the operating conditions of the treatment were controlled within close limits. (Author)

AD-295 772 Div. 17, 14
(TISTM/SJR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RESOLUTIONS OF THE COORDINATION COMMITTEE ON THE SUBJECT STRENGTH OF THIN-WALLED CONSTRUCTIONS,
by V. S. Çumenyuk. 2 Jan 63, 7p. (Trans. no. FTD-TT-62-1624 from Ukrainian Periodical, Prykladna Mekhanika, Vol. 7, No. 1, pp. 110-112, 1961)
Unclassified report

DESCRIPTORS: *Structural shells, Orifices, Stresses, Deformation, Torque, Equations of state, Elasticity, Mechanical properties, Loading, Alloys, Metals, Polymers, Gas flow, Liquids, Solids, Surface properties, Plastic flow, Structures, Creep, Shock waves, Fatigue (Mechanics), Symposia.

AD-295 818 Div. 17, 27
(TISTM/RGR) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A METAL FOR STEAM TURBINES WITH HIGH AND SUPERCRITICAL STEAM PARAMETERS,
by E. S. Ginzburg. 10 Jan 63, 23p. incl. illus. tables, 8 refs. (Trans. no. FTD-TT-62-1273 from Povysheniye Parametrov Para I Moshohnosti Agregatov V Teploenergetike, Sbornik Statey, Gosenergoizdat, Moskva, pp. 112-121, 1961)
Unclassified report

DESCRIPTORS: *Steam turbines, *Refractory materials, USSR, Production, Welding, Design, Steam, Processing, Forging, High temperature research, Coupling, Pearlite, Castings, Rotor blades, Thermal stresses, Manufacturing methods, Steel.

AD-295 857 Div. 17, 26
(TISTM/BRW) OTS price $5.60

Du Pont Metals Center, E. I., Du Pont de Nemours and Co., Inc., Baltimore, Md.
COLUMBIUM ALLOY EXTRUSION PROGRAM. PHASE V:

TUBING PROGRAM.
Interim technical documentary progress rept. no. 7, 15 Oct 62-15 Jan 63,
by James S. Clark. 15 Jan 63, 47p. incl. illus. tables, 6 refs.
(Contract AF 33(600)40700, Proj. 7-775)
Unclassified report

DESCRIPTORS: *Niobium alloys, *Pipes, Dies, Lubricants, Glass, Mechanical properties, Heat treatment, Hardness, Microstructure, Surface properties, Ceramic coatings, Titanium alloys, Molybdenum alloys, Vanadium alloys, Zirconium alloys, Tungsten alloys, Extrusion, Manufacturing methods.

AD-295 919 Div. 17, 26
(TISTM/BRW) OTS price $7.60

Solar, San Diego, Calif.
DIFFUSION BONDING OF REFRACTORY METALS.
Interim technical documentary progress rept. no. 2, 29 Sep-28 Dec 62,
by A. G. Metcalfe and T. B. Lindemer. 2 Jan 63, 69p. incl. illus. tables, 6 refs. (Rept. no. RDR 1322-2)
(Contract AF 33(657)8789, Proj. 7-935)
Unclassified report

DESCRIPTORS: *Refractory materials, *Metals, Tantalum, Tungsten, Rhenium, Niobium, Molybdenum alloys, Titanium alloys, Zirconium alloys, Titanium, Vanadium, Heat resistant alloys, Brazing, Bonded joints, Welds, Coatings, Metal coatings, Metal joints, Airframes, Scientific research, Bonding, Diffusion.

Six concepts to actuate the diffusion bonding process were evaluated experimentally. Three of these - surface active elements, recrystallization of cold worked metal, and allotropic transformations - promote bonding. Small atom diffusion aids, acceleration of diffusion by a high frequency field, and bonding under subsolidus conditions are ineffective or inapplicable to refractory metal bonding. The magnitude of improvement of joints with intermediate foils that recrystallize or undergo allotropic transformation has been found to be small, whereas surface active elements produce a severalfold increase in bond strength. (Author)

AD-295 930 Div. 17, 25
(TISTW/PCR) OTS price $1.10

Battelle Memorial Inst., Columbus, Ohio.
DIFFUSION IN SOLIDS.
Final rept., 1 July 61-31 Dec 62,
by A. E. Austin and F. J. Milford. 17 Jan 63, 2p. 4 refs.
(Grant AF-AFOSR-61-107)
Unclassified report

DESCRIPTORS: *Diffusion, *Solids, Gold, Copper, Crystals.

Previous investigations studied the diffusion of nickel into copper bicrystals, while the present experiments have been concerned with the diffusion of gold into copper bicrystals. The theoretical solutions and approximations were evaluated mathematically and the results used for the analysis of the experimental data. The case of surface diffusion in metal systems is comparable to that of grain-boundary diffusion in that both involve concomitant volume diffusion. Therefore experimental and theoretical studies of surface diffusion were initiated as an extension of those on grain-boundary diffusion. (Author)

AD-295 980 Div. 17, 26
(TISTM/BRW) OTS price $1.10

Oregon Metallurgical Corp., Albany.
EVALUATION OF MOLYBDENUM METAL PRODUCED BY THE TIN REDUCTION OF MOLYBDENUM DISULPHIDE PROCESS.
Quarterly progress rept. no. 3, 13 Oct 62-13 Jan 63,
by Charles Krey, H. Gordon Poole, and Stephen M. Shelton. 13 Jan 63, 7p. incl. tables.
(Contract NOw 62-0754-c) Unclassified report

DESCRIPTORS: *Molybdenum, Molybdenum compounds, Sulfides, Reduction, Mechanical properties, Spectrographic analysis, Chemical analysis, Melting, Electric arcs, Powder metals, Separation, Production.

18. MILITARY SCIENCES AND OPERATIONS

AD-295 020 Div. 18
(TISTA/GEC) OTS price $1.10

Human Resources Research Office, George Washington U., Washington, D. C.
A BIBLIOGRAPHY ON THE ROLE OF AIR POWER IN GUERRILLA AND COUNTERGUERRILLA OPERATIONS.
Research memo. rept.,
by Franklin Mark Osanka. Nov 62, 5p.
(Contract DA 44-188-ARO-2)
Unclassified report

DESCRIPTORS: *Guerrilla warfare, *Bibliography, Air force operations.

A bibliography of 70 references which deal with various aspects of air power in guerrilla and counterguerrilla operations is presented. The most commonly known roles of air power in such operations are troop and equipment movement by helicopter and fixed wing aircraft, close air support, psychological warfare, and deployment of parachute forces. Other activities covered in this bibliography are observation, reconnaissance, survey, intelligence; command, liaison, communications, infiltration and exfiltration of operatives; and air installation security measures. (Author)

AD-295 021 Div. 18
(TISTB/DGH) OTS price $2.60

Human Resources Research Office, George Washington U., Washington, D. C.
COUNTERINSURGENCY TRAINING. A SELECTED SUBJECT BIBLIOGRAPHY.
Research memo. rept.,
comp. by Franklin Mark Osanka. Nov 62, 18p. refs.
(Contract DA 44-188-ARO-2)
Unclassified report

DESCRIPTORS: *Guerrilla warfare, *Training, *Bibliography, Asia, Civilian defense systems, National defense, Communism, Theory, Foreign policy, Riot control, Psychological warfare, Countermeasures.

A bibliography concerning the various aspects of counterinsurgency and unconventional warfare is presented. For the most part, the items cited have been published recently. Sometimes not so

recent items are included when any of the subject categories are exceptionally weak. While individuals may find many different uses for this bibliography, it is designed primarily for individual study and unit training. The majority of the items in this bibliography are available in average-sized Service libraries and in many of the larger public libraries. Items not available in a given library can often be obtained through inter-library loan. (Author)

AD-295 022 Div. 18
(TISTB/DGH) OTS price $1.60

Human Resources Research Office, George Washington U., Washington, D. C.
UNCONVENTIONAL WARFARE. AN ANNOTATED BIBLIOGRAPHY OF PAPERBACK BOOKS.
Research memo. rept.,
comp. by Franklin Mark Osanka. Aug 62, 13p.
(Contract DA 44-188-ARO-2)
Unclassified report

DESCRIPTORS: *Guerrilla warfare, *Bibliography, Evasion.

This bibliography of paperbound books covers the various aspects of unconventional warfare. Most of the items are both educational and easy to read and should prove particularly useful for lower echelons. The majority of these inexpensive books appeared originally in clothbound editions. There are various definitions of the term 'unconventional warfare' but we have adhered to the following: Unconventional warfare consists of the interrelated fields of guerrilla warfare, escape and evasion, and subversion against hostile states (resistance). Unconventional warfare operations are conducted in enemy or enemy-controlled territory by predominately indigenous personnel usually supported and directed in varying degrees by an external source. Extensive and detailed annotations have been given to the time-tested and more serious books included in this bibliography. The brief annotations given to many of the books indicate the superficial nature of their treatment of the subject. (Author)

AD-295 561 Div. 18
(TISTB/MS) OTS price $4.60

RAND Corp., Santa Monica, Calif.
THE DSA AND MILITARY LOGISTICS,
by R. Piekarz. Nov 62, 36p. incl. table.
(Research memo. no. RM 3188-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *National defense, *Logistics, *Military procurement, *Management engineering, Supply depots, Supplies, Military requirements, Effectiveness, Analysis.

Contents:
Defense Supply Agency responsibilities, organization, and functions
Responsibilities
Organization
Functions
The DSA and materiel management
The necessity to modify the logistics structure
Links to connect DSA and service activities
Organizing a new wholesale logistics agency
Reorienting service logistics organization
A checklist of some questions

19. NAVIGATION

AD-295 099 Div. 19, 1
(TISTA/FRL) OTS price $6.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
ALTITUDE INFORMATION AND TACTICAL AIR NAVIGATION.
Master's thesis,
by James A. Schmitendorf. Dec 62, 58p. incl. illus. 10 refs. (Rept. no. GE/EE/62-19)
Unclassified report

DESCRIPTORS: *Altimeters, Manometers, Circuits, Computer logic, Digital computers, Multiplex transmission, Theses, Air traffic control systems, Flight instruments, Analog-to-digital converters.

An altitude encoder for the aircraft owner who can least afford the complicated equipment used by the military and airlines is discussed. Also considered is a method of transmitting the encoded altitude to ground controllers by means of superimposing altitude information with distance measuring interrogation signals. A mercury manometer was demonstrated to be feasible for encoding but it was not practical due to its large size. The standard aneroid altimeter was shown to be both feasible and practical as modified to serve an additional function as an encoder. A Kollsman altimeter was modified for optical altitude encoding at a cost of approximately $50. A digital logic circuit was devised for transferring the altitude information to a military Tactical Air Navigation transmitter and the transmitter was modified to send out altitude information while retaining its normal distance measuring interrogation function. Distance Measuring Equipment (DME) was chosen as a transmission media. (Author)

AD-295 916 Div. 19, 12
(TISTW/JEA) OTS price $8.60

RCA Defense Electronic Products, Burlington, Mass.
ERROR STUDY OF ORBITAL PREDICTIONS.
Final rept.,
by J. Boddy and M. Grossberg. 20 Apr 62, 79p. incl. illus. tables (Rept. no. CR-588-77)
(Contract AF 19(604)8041)
(ESD TDR 63-189) Unclassified report

DESCRIPTORS: *Errors, *Satellite vehicle trajectories, *Celestial navigation, *Satellite vehicles, *Orbital flight paths, Digital systems, Data processing systems, Experimental data, Statistical analysis, Motion, Celestial mechanics, Celestial guidance, Simulation, Friction, Optical tracking, Probability, Series, Propagation, Least squares method, Mathematical prediction, Analysis, Recovery.

A statistical analysis of sensor data obtained from the observations of artificial satellites is presented. The effect of these statistics on the estimation of the orbital elements has been evaluated. Several techniques for removal of the actual orbit from the observations to derive residuals have been investigated. The residuals have been obtained using both polynomial fitting with and without autoregressive scheme. From the satellites considered, no consistency was apparent in the magnitude of the variances of the individual parameters. However, a consistency was noted in the skewness of the residual. Computer programs have been developed for the determination of the statistics of the orbital

elements from observation data. The study shows that the variances of the orbital elements are functions of the variance of the observations, the time of observation and description of the motion of the satellite. Furthermore the variance of any orbital elements is minimum if the sum of the variance of the observations at a given time is minimum for a specific computational procedure of the orbital element from observations. (Author)

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-295 003 Div. 20, 6
(TISTW/PCR) OTS price $3.60

Armour Research Foundation, Chicago, Ill.
A NUCLEAR-PHOTON ENERGY CONVERSION STUDY.
Quarterly technical rept. no. 3, 1 Oct-31 Dec 62, by H. V. Watts and S. Nudelman. 15 Jan 63, 29p. incl. illus. refs. (Rept. no. ARF 1214-TR 3)
(Contract AF 33(657)8527, Proj. 8173)
Unclassified report

DESCRIPTORS: *Photons, *Luminescent materials, *Photoelectric cells, *Nuclear energy, Luminescence, Crystal detectors, Geometry, Powders, Radioactive isotopes, Power supplies, Thickness, Beta particles, Zinc, Cadmium, Sulfur, Copper, Promethium, Strontium, Energy, Phosphors, Temperature.

The temperature dependence and phosphor thickness dependence on the luminescence output was studied for several phosphors which appear promising for use in a nuclear-photon energy conversion system. In this system, beta particles from a radioisotope source are absorbed by the phosphor which emits a multiplicity of low energy photons. These photons are then converted to electrical energy by a photovoltaic device. The most promising phosphor to date, a ZnCdS:Cu, had about a 15% decrease in luminescence intensity as the temperature was increased from room temperature to 120 C, and was found to be relatively transparent to its own light with an optimum thickness for Sr90 beta excitation of 160 mg/sq cm. Strontium-90 beta particle radiation damage studies on this phosphor indicate an onset of damage at a total radiation dose of 10 to the 8th power ergs/sq cm. These data indicate that Sr90 cannot be used and that the maximum operating temperature is about 120 C. Calculations indicate that, with a maximum temperature of 120 C allowed in the device, a maximum power input density of 200 mw/sq cm is permitted. Experiments are in progress on the source-phosphor geometry of an intimate powder mix of promethium-147 and ZnCdS:Cu. Also, experiments are being conducted on the fabrication of a single crystal phosphor - photovoltaic device. (Author)

AD-295 053 Div. 20, 15
(TISTW/JEA) OTS price $4.60

Institute of Mathematical Sciences, New York U., N. Y.
A MODEL FOR THE STATISTICAL ATOM WITH NON-VANISHING ANGULAR MOMENTUM,
by Judah L. Schwartz and Sidney Borowitz.
Dec 62, 39p. 16 refs. (Research rept. no. CX-59)
(Contracts AF 19(604)4555, Proj. 7635, DA 30-069-ORD-2581, Proj. 2360 and Nonr-28549, Proj. NR 012-109)
(AFCRL 62-1089) Unclassified report

DESCRIPTORS: *Atoms, *Quadrupole moments, *Green's function, *Atomic energy levels, Nuclei, Nucleons, Spheres, Energy, Atomic orbitals, Quantum mechanics, Quantum statistics, Nuclear shell models, Nuclear moments, Density, Fourier analysis, Molecular rotation, Atomic mass unit, Integral equations, Atomic structure, Transformations (Mathematics), Bessel functions, Differential equations, Halogens, Statistical tests, Particles, Electrons.

In the first of the coupled integro-differential equations satisfied by the Green's functions of the many body system the Hartree-Fock approximation is made for the two particle Green's function. The resulting equation is written in a mixed position-angular momentum representation in such a way that use may be made of whatever empirical information about the angular momentum of the system is available. In contrast to the previous work the present formalism yields a sign change for the quadrupole coupling constant on passing through closed shells and calculated values for the quadrupole coupling constant of the halogens are seen to be within an order of magnitude of the accepted values. (Author)

AD-295 152 Div. 20, 30, 15
(TISTW/PCR) OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
LIQUID MODEL STUDIES OF THE BASE SURGE,
by E. Swift, Jr. 1 Oct 62, 22p. incl illus. table, 7 refs. (NOLTR 62-191)
Unclassified report

DESCRIPTORS: *Underwater explosions, Nuclear explosions, Model tests, Scale, Correlation techniques, Mathematical analysis, Equations, Photographs, Tests, Test methods, Test facilities, Nuclear weapons, Simulation.

When a constrained column of dense liquid standing on the bottom of a tank of water is released suddenly, it sinks and flows outward radially along the bottom. This action simulates the early motion of the base surge from shallow underwater explosions. Such liquid model experiments are described, scaling laws are derived, and comparisons with CROSSROADS Baker are made. It is estimated that between 100,000 and 130,000 tons of water in the Baker column contributed to the surge, that the column height was between 3500 and 4000 feet, and that the column density was between 1.4 and 1.6 times that of air. (Author)

AD-295 159 Div. 20, 12, 7
(TISTA/FRL) OTS price $11.50

North American Aviation, Inc., Downey, Calif.
FLIGHT TEST CRITERIA FOR RE-ENTERING NAP SYSTEM.
Interim rept. on Phase A.
Nov 62, 146p. incl. illus. tables, 8 refs.
(Contract AF 29(601)5104, Proj. 1831)
(AFSWC TDR 62-83) Unclassified report

DESCRIPTORS: *Power reactors, *Satellite vehicles, Flight testing, Safety, Re-entry aerodynamics, Booster rockets, Orbital flight paths, Deceleration, Heat transfer, Thermodynamics, Re-entry vehicles, Drag, Guided missiles (Surface to surface), Combustion, Satellite vehicle trajectories, Integral equations, Computers, Instrumentation, Guided missile launchers, Costs, Launching sites, Reliability, Design, Fuel elements, Radiation hazards, Electric power production, Disposal.

This interim report covers Phase A of the Flight

Test Criteria Study which will determine criteria that can be used as guidelines in setting up a flight test program or in judging one that has been proposed. This study is intended to be universal in application to NAP re-entry phenomena. The SNAP 10A was designated to provide a representative system for study. The various parameters considered and topics discussed in this report include orbital decay and thermodynamic data, scaling, instrumentation, launch vehicles and sites, and reliability. Significant among the interim conclusions reached is the determination that a 300,000-foot re-entry altitude can be used. (Author)

AD-295 486 Div. 20
(TISTP/JW) OTS price $4.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
TRANSIENT RADIATION EFFECTS ON COAXIAL CABLES. Special technical report,
by G. R. Hopkins, A. L. A. Weiman, and D. E. Willis. 18 Dec 62, 43p. incl. illus. tables, 1 ref. (Rept. no. GA-3616)
(Contract DA 36-039-sc-89196)
Unclassified report

DESCRIPTORS: *Radiation effects, *Gamma rays, *Neutron flux density, Signals, Shielding, Nuclear power plants, Pulse generators, Coaxial cables, Thermal diffusion, Analysis.

An investigation into the radiation effects of gamma and neutron radiation on polyethylene coaxial cable has been started. By a series of tests made in the General Atomic TRIGA Mark F reactor, individual effects due to gamma, fast, and thermal neutron flux have been separated and analyzed. Gamma radiation produces a current nearly proportional to incident flux with the central wire at a negative potential. Thermal neutron flux also produces a nearly proportional signal but with the central wire going positive. Fast neutron flux produces a positive-going signal having two components. One component is proportional to flux; the other produces a very large initial signal but saturates quickly. Saturation occurs as integrated fast neutron flux increases and is not time dependent. Varying amounts and types of shielding provided large changes in relative components of flux, both with pulsing and steady-state modes of operation. The data were analyzed for each type of radiation. Although the effects have been analyzed in some detail, more investigation is required to supply more accurate numbers. Special experiments should provide clues as to which of several possible mechanisms are involved. (Author)

AD-295 668 Div. 20
(TISTM/EJH) OTS price $6.60

General Dynamics/Fort Worth, Tex.
FISSION PRODUCTS FIELD RELEASE TEST III. Dec 62, 61p. incl. illus. tables, 3 refs.
(Proj. 655A)
(AFSWC TDR 62-54) Unclassified report

DESCRIPTORS: *Fuel elements, *Reactor fuels, *Fission products, Ceramic materials, Uranium compounds, Beryllium compounds, Oxides, Melting, Iodine, Cesium, Radioactive isotopes, Scattering, Gamma ray spectroscopy, Zirconium, Tellurium, Cerium, Ruthenium, Strontium, Particles, Body fluids, Sampling, Solubility.

A series of field experiments was conducted to determine the types and quantities of radioactivity that might be released during the meltdown of a PLUTO-type reactor. Four fission-product releases from the melting of segments of freshly irradiated UO2 - BeO ceramic unclad fuel elements were made at the National Reactor Testing Station in Idaho during the summer of 1961. The fuel samples were melted in high-temperature induction furnaces; three releases were made into collectors designed to trap 100% of the released fission products (with the exception of the noble gases) and one release was made to the atmosphere. Experimental results such as release percent, particle-size distribution, air and ground concentration, deposition velocity, and solubility are given. The quality and value of these data are diminished because of unanticipated difficulties in dissolving the post-melt irradiated fuel pins and mishaps connected with two of the closed release experiments. However, since only sparse data relating to release of fission products from PLUTO fuel elements are available, the experimental results are presented to provide rough indications of fission product release behavior under conditions simulating after-heat melting of the PLUTO core. (Author)

AD-295 691 Div. 20
(TISTM/EJH) OTS price $6.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
NEUTRON TRANSMISSION VERSUS THICKNESS FOR SOME COMMON MATERIALS,
by Frank J. Allen, Arnold T. Futterer, and William P. Wright. Sep 62, 72p. incl. illus. table, 8 refs. (BRL rept. no. 1174)
(DA Proj. 512-10-001)
Unclassified report

DESCRIPTORS: *Neutrons, *Shielding, Neutron bombardment, Dosage, Transmission, Materials, Thickness, Water, Polymers, Ethylenes, Boron, Iron, Concrete, Soils, Laminates.

Curves of neutron dose transmission versus thickness are presented for laterally infinite slabs of several common materials for neutrons incident at several fixed energies and angles. The materials are: water, polyethylene (borated), iron, concrete, Nevada Test Site soil (area 7, dry and 100 percent saturated), laminated slabs containing one inch of iron on the outside, a variable thickness of iron on the inside, and 3, 6, 9, or 12 inches of polyethylene sandwiched between the layers of iron. The neutron source energies are 0.5, 1, 2, 3, 5, and 14 mev; the incident angles are 0, 30, 45, and 70 degrees. (Author)

AD-295 695 Div. 20, 8
(TISTE/CAM) OTS price $6.60

Bendix Systems Div., Bendix Corp., Ann Arbor, Mich.
STUDY TO DETERMINE EFFECTS OF FISSION PRODUCT GAMMA RADIATION ON ELECTRONIC PARTS AND EQUIPMENT. Progress rept. no. 3, 1 Sep-30 Nov 62,
by R. M. Magee, D. A. Courtois and D. D. Majeske. 30 Nov 62, 1v. incl. illus. tables (Rept. no. BSC 36074)
(Contract NObsr-87267)
Unclassified report

DESCRIPTORS: *Printed circuits, *Gamma rays, *Radiation damage, Radiation effects, Dosimeters, Ionization chambers, Instrumentation, Test equipment, Test methods, Measurement,

Tables, Cobalt, Glass, Temperature, Pulse generators, Timing circuits, Trigger circuits, Waveform generators, Test facilities, Electronic equipment.

The effects of gamma radiation on circuit cards and associated equipment were investigated. Four types of circuit cards were tested in gamma ray environments up to 300,000 r/hr, and up to total doses of 15,000 roentgens. No significant effects on the performance of these circuit cards were observed. (Author)

AD-295 718 Div. 20
(TISTW/RD) OTS price $6.60

General Dynamics/Fort Worth, Tex.
ENERGY AND ANGULAR DISTRIBUTION EXPERIMENT. VOLUME I: ANGULAR DISTRIBUTION OF REACTOR RADIATION FROM SLABS AND OF EMERGENT SECONDARY GAMMA RAYS,
by G. T. Western. 31 Dec 62, 71p. incl. illus. table, 7 refs. (Document no. NARF-62-16T: FZK-9-183-1)
(Contract AF 33(657)7201)
Unclassified report

DESCRIPTORS: *Test reactors, Polymers, Ethylenes, Lead, Nuclear energy, Scattering, Dose rate, Neutron detectors, Gamma rays, Thermal neutrons, Fast neutrons.

AD-295 747 Div. 20, 16
(TISTW/RD) OTS price $2.60

Hughes Research Labs., Malibu, Calif.
A SOLID STATE ROCKET RADIATION DETECTION SYSTEM. Final rept., 1 Sep 6430 Nov 62,
by Norman A. Baily and Frederick W. Cleary.
30 Nov 62, 25p. incl. illus. tables, 1 ref.
(Contract DA 49-193-md-2194)
Unclassified report

DESCRIPTORS: *Radiation counters, *Radioactivity, *Wounds, Silicon, Gamma rays, X rays, Semiconductors, Alpha particles, Beta particles, Solid state physics, Detection, Contamination, Radiation effects.

A pocket-size radiac instrument has been designed to operate with silicon p-i-n junction detectors. These detectors are sensitive to both x or gamma radiation and also to charged particles including alpha particles. The electronic system can read out counting rates in the range of zero to 100,000 counts/min in four linear decades. A large, flat detector is mounted into the back surface of the case. A plug-in probe using a cylindrical detector is furnished for possible insertion into small volumes in the body or in open wounds. Both detectors are protected by a silicon monoxide coating. Discrimination between pulses due to alpha or other heavily ionizing particles and those due to photons or betas is provided. The unit, therefore, combines two separate sensitive volumes: (1) A large area detector (approximately 6 sq. cm. which can detect very low levels of radioactivity. This detector will allow a monitor to scan the surface and clothing of persons suspected of radioactive contamination. (2) A probe, which is 3 mm in diameter at the tip and 3 feet in length, which plugs into a receptacle on the top of the case, and is designed so that it can be sterilized and therefore can be inserted directly into an open wound. Absolute sensitivity over that reported can be increased if discrimination between heavily ionizing particles and photon radiation is eliminated. (Author)

AD-295 757 Div. 20
(TISTP/JW) OTS price $1.60

Army Armor Board, Fort Knox, Ky.
CONFIRMATORY TEST OF RADIACMETER, PAC-1SA.
5 Feb 63, 5p. illus. (DA Proj. 2163-1)
Unclassified report

DESCRIPTORS: *Gamma counters, Plutonium, Instrumentation, Tests.

AD-295 770 Div. 20
(TISTP/JW) OTS price $4.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METHODS OF CALCULATING NUCLEAR REACTORS (SELECTED PARTS),
by G. I. Marchuk. 21 Dec 62, 42p. 318 refs. (Trans. no. FTD-TT-62-1814 from Gosudarstvennoye Izdavel'stwo Literatury V Oblasti Atomnoy Nauki I Tekhniki, pp. 2-17, 647-661, 1961)
Unclassified report

DESCRIPTORS: *Nuclear power plants, Bibliography, Translations, USSR, Analysis.

Basic methods of physical calculation of nuclear reactions are explained. Algorithms were developed for practical utilization of mathematical methods for solving various problems originating during the planning of experimental and atomic energy installations. Calculated values are given of critical masses of reactors which can be used in practical operation. (Author)

AD-295 814 Div. 20
(TISTM/ODN) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE ISOTOPIC EFFECT IN THE ELECTROSYNTHESIS OF OZONE BY RAYLEIGH'S METHOD,
by I. A. Tikhomirov and V. N. Melenevskiy.
8 Jan 63, 6p. incl. illus. 3 refs. (Trans. no. FTD-TT-62-1535 from Zhurnal Fizicheskoy Khimii, 36:4, pp. 895-897, 1962)
Unclassified report

DESCRIPTORS: *Isotopes, *Ozone, Isotope separation, USSR, Oxygen, Synthesis.

AD-295 816 Div. 20
(TISTE/OHD) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A DEVICE FOR MEASURING ION CURRENTS IN MASS-SPECTROMETER CIRCUITS,
by V. I. Rakhovskiy, A. P. Lyubimov and others. 17 Jan 63, 4p. incl. illus. (Trans. no. FTD-TT-62-1529 from Soviet Patent No. 144559 (685696/26) 15 Nov 1960)
Unclassified report

DESCRIPTORS: *Mass spectrometers, Ionic current, Photomultipliers, Geiger counters, Translations, Patents, USSR.

AD-295 888 Div. 20, 27
(TISTM/ODN) OTS price $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
A CONTINUOUS SCAN SCINTILLATION SYSTEM FOR THE INSPECTION OF TUNGSTEN BILLETS,
by H. A. Zagorites and K. F. Sinclair. 10 Dec 62, 27p. incl. illus. 7 refs. (Rept. no. NRDL TR-602)
Unclassified report

DESCRIPTORS: *Rocket motor nozzles, *Scintillation counters, *Tungsten, Rocket motors, Manufacturing methods, Sensitivity, Volume, Detectors, Test equipment, Non-destructive testing, Operation.

A continuous scan system, employing a 200 curie Co-60 source, scintillation detection of transmitted radiation, differential dc amplification and strip-chart recording, has been applied experimentally to the inspection of tungsten billets used in the fabrication of nozzles for solid propellant rocket motors. The results of a detailed inspection of an uninfiltrated billet, supplied during the first phase of a round robin among a manufacturer and several Navy laboratories, were in agreement with radiographic data obtained during an earlier inspection. With this billet, the volume sensitivity of the system was measured to be about 0.050 cu.cm., which was within a factor of two of the predicted sensitivity of 0.027 cu.cm. The experimental work showed the feasibility of the continuous scan method as a primary inspection method for the inspection of tungsten billets and clearly demonstrated its usefulness in the present state of development as a supplement to film radiography. (Author)

AD-295 981 Div. 20, 8
(TISTP/FR) OTS price $1.10

Naval Radiological Defense Lab., San Francisco, Calif.
A METHOD OF COMPENSATING FOR TEMPERATURE-DEPENDENCE OF A REMOTE AREA GAMMA MONITORING SYSTEM,
by P. A. Covey. 27 Nov 62, 11p. incl. illus. 2 refs. (Rept. no. NRDL-TR-604)
Unclassified report

DESCRIPTORS: *Gamma counters, Monitors, Temperature, Diurnal variations, Thermistors, Resistors, Calibration.

AD-295 989 Div. 20
(TISTW/PCR) OTS price $1.60

Aerospace Information Div., Washington, D. C.
SOVIET NUCLEAR RESEARCH REACTORS VVR-S (MOSCOW) AND VVR-S (TASHKENT). REVIEW OF SOVIET LITERATURE.
21 Jan 63, 12p. incl. illus. 6 refs. (AID rept. no. P-63-14)
Unclassified report

DESCRIPTORS: *Research reactors, *USSR, Enriched fuel reactors, Light water reactor, Reactor control, Reactor coolants, Reactor Moderators, Reactor safety systems, Construction, Pumps, Photographs, Drafting.

A description is given of the two Soviet water-moderated water-cooled reactors (VVR-S), one of which is located in Moscow and the other in Tashkent, Uzbekskaya SSR. The VVR-S reactors, intended for experimental and research purposes, were developed from the experimental enriched-uranium VVR reactor. Background information, general construction details, features of the control and safety systems, and information on the experimental facilities afforded by the reactor are presented. (Author)

21. NUCLEAR PROPULSION

No Entries

22. ORDNANCE

AD-294 965 Div. 22
(TISTW/JEA) OTS price $1.10

Little, Arthur D., Inc., Cambridge, Mass.
SENSITIVITY OF CASED EXPLOSIVE MATERIALS TO IMPACT BY REGULAR FRAGMENTS.
Monthly progress rept. no. 9, 31 Oct-30 Nov 62. 30 Nov 62, 2p. tables.
(Contract DA 19-020-ORD-5617)
Unclassified report

DESCRIPTORS: *Explosives, Propellants, Fragmentation, Rocket cases, Projectile cases, Pentolite, Tests, Thickness, Velocity, Sensitivity, Impact shock, Storage.

Test data are given for an experimental program dealing with the sensitivity of certain cased explosives and propellants to impact by regular fragments. The program is designed to aid in determining a more realistic quantity-distance relationship for the storage of ordnance ex-

plosive material. It is the intent of this project, through an experimental program, to establish a limiting fragment mass vs impact velocity relationship for the detonation of certain explosives and/or propellants enclosed in casings of different thicknesses. This report discusses the first firings of fragments into receiver charges cast with pentolite explosive. No detonations were recorded. (Author)

AD-294 978 Div. 22, 7
(TISTW/JEA) OTS price $1.10

Aerojet-General Corp., Downey, Calif.
PULSE-SENSITIVE ELECTROEXPLOSIVE DEVICES.
Monthly technical progress rept. no. 6 for Dec 62,
by H. M. Kenworthy. 15 Jan 63, 5p. incl. illus. 3 refs. (Rept. no. 0689-01(06)MP)
(Contract N178-8107)
Unclassified report

DESCRIPTORS: *Electric detonators, *Igniters, Explosives, Ceramic materials, Direct current, Electric bridges, Heat transfer, Metal films, Thermal conductivity, Stresses, Heating elements, Pulse analyzers, Manufacturing methods.

Research data are presented on the behavior of a metallic film whin it is electrically heated and is in physical contact with a heat sink. The study covered the variable parameters and the development of a manufacturing process or processes for applying a bridge heating element to a ceramic surface with the required thermal contact. (Author)

AD-294 985 Div. 22, 30
(TISTW/JEA) OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
EXPLOSIONS IN VACUUM,
by Morton Lutzky. Nov 62, 24p. incl. illus. tables, 8 refs. (NOLTR 62-19)
Unclassified report

DESCRIPTORS: *Explosions, *Pentolite, Digital computers, Density, Energy, Measurement, Detonation, Gases, Impact shock, Tests, Targets, Pressure, Equations of state, Vacuum apparatus, Explosives, Vacuum systems.

The results of an IBM-704 machine calculation of the explosion of a 1-lb. charge of pentolite in vacuum and the expansion of the detonation product gases to strike a concentric rigid spherical target are reported. Alternative equations of state were employed in the calculation (ideal gas with constant gamma, and ideal gas with variable gamma) and the results compared. Plots are given of pressure and energy density, versus distance, at various times after the wall was struck, and pressure-time histories of the gas at the wall. Representative values for the peak wall pressure at various distances from the center, for the constant gamma case, are 22,712 Bars at 8.0 cms., 805.6 Bars at 24.0 cms., and 5.37 Bars at 128.4 cms. Scaling to other distances and charge weights is considered. A 512-lb pentolite charge, for example, is shown to produce a pressure of 145 psi at the wall some 26 ft away. Such a pressure, if applied to a spacecraft, would probably destroy it. (Author)

AD-295 417 Div. 22
(TISTW/JEA) OTS price $1.10

Army Armor Board, Fort Knox, Ky.
EVALUATION OF COMPUTER, BALLISTIC, M13A1D, WITH IMPROVED ILLUMINATION FOR M60 SERIES TANKS.
29 Jan 63, 5p. incl. illus. 4 refs. (Proj. 1F-3216-42)
Unclassified report

DESCRIPTORS: *Computers, Illumination, Control panels, Tests, Indicator lights, Instrument panels, Intensity, Ballistics, Tanks.

A standard M13A1D ballistic computer was modified to incorporate illumination for the super-elevation counter and improved illumination for the range scale. A folding ammunition selector handle was provided in order to increase the gunner's elbow room in the M60A1 tank. This computer differs from a model tested in that the method of illuminating the range dial was altered to improve the visibility of the inner and outer index marks. In addition, the conventional reset button and indicator light were restored. (Author)

AD-295 474 Div. 22
(TISTM/SJR) OTS price $1.25

Springfield Armory, Mass.
INVESTIGATION OF PACKAGING METHODS AND SUBMETHODS WITH VOLATILE-CORROSION-INHIBITOR TREATED MATERIALS,
by G. Pributsky. 1 Aug 62, 45p. incl. illus. tables (Rept. no. SA-TR20-2313)
Unclassified report

DESCRIPTORS: *Storage, *Exposure, *Small arms, *Tropical deterioration, *Packaging, Humidity cabinets, Esters, Polymers, Coatings, Preservation, Manganese compounds, Phosphates, Corrosion inhibition, Corrosion research, Protective coverings.

Various submethods with volatile-corrosion-inhibitor-treated materials in the packaging of small arms components were investigated. Packages were stored under two conditions: (1) in an outdoor shed to simulate minimum warehouse storage and (2) in a static humidity cabinet to simulate tropic storage. Heat-sealable polyester film with volatile-corrosion-inhibitor innerwrap provided satisfactory protection in the humidity cabinet for one year. Results of this investigation indicate that packaging submethods other than those specified in MIL-I-8574 can be satisfactorily used with VCI preservatives. Test procedures are described and results given. (Author)

AD-295 595 Div. 22, 17, 30
(TISTW/PCR) OTS price $11.50

Aerojet-General Corp., Downey, Calif.
AN IMPACT AND PENETRATION EFFECTS STUDY.
Final rept.,
by J. E. Ferguson. Jan 63, 154p. incl. illus. tables, 2 refs.
(Contract AF 08(635)975)
(APGC TDR 63-2) Unclassified report

DESCRIPTORS: *Shaped charges, *Hypervelocity projectiles, Test facilities, Targets, Armor plate, Armor piercing ammunition, Thickness, Aluminum, Copper, Projectiles, Velocity, Radiography, Spallation, Cratering, Photographs, High speed photography, Tables, Accelerators, Impact shock, Penetration.

The Shaped Charge Hypervelocity Projectile Accelerator is being used to study impact and penetration effects upon various thicknesses of targets at velocities between 24,000 and 39,000 feet per second. This report presents and analyzes 208 data points gathered for impacts in the 29,000-33,000 fps velocity range, with 0.03-0.8 gram aluminum projectiles against 0.375-inch, 0.500-inch, 1.00-inch and 4.0-inch thick 2024-T4 aluminum target plates; 19 data points gathered for impacts in the 35,000-39,000 fps velocity range with 0.01-0.7 gram aluminum projectiles against 0.100-inch thick 2024-T4 aluminum target plates; and 63 data points gathered for impacts in the 22,000-26,000 fps velocity range with 0.02-0.7 gram copper projectiles against 0.100-inch thick 2024-T4 aluminum target plates and 0.500-inch thick soft copper target plates. Angles of obliquity between the velocity and the target surface for these experiments were 90, 50 and 20 degrees. Curves, photographs, and flash radiographs illustrating the data are presented. (Author)

AD-295 739 Div. 22
(TISTW/RD) OTS price $6.60

Picatinny Arsenal, Dover, N. J.
A UNIQUE UNIVERSAL TYPE INSTRUMENT TO LOCATE CENTER OF GRAVITY OF VARIOUS WARHEADS,
by David Stein and Mark H. Weinberg. Dec 62, 1v. incl. illus. (Technical rept. no. 3059)
Unclassified report

DESCRIPTORS: *Rocket heads, *Artillery rockets, *Warheads, Gravity, Load distribution, Stability.

A unique, universal type device to locate the center of gravity of various warheads is described. Simple basic principles are utilized in a new configuration to produce a highly precise instrument which may be adapted to locate center of gravity of warheads with a constant accuracy of about 0.002 inch. Both longitudinal distance from warhead reference surface and radial displacement from warhead axis are determined in a single handling of the warhead, thereby eliminating the need for two separate devices. The instrument was designed specifically for warheads in the Littlejohn and Honest John Systems (weight range up to 1700 pounds; centroid up to 37 inches from rear mounting surface). However, its total range of capability extends from essentially zero to a warhead which exerts 80,000 inch-pounds of moment (warhead weight times centroidal distance from rear reference plane). Mounting provisions are made for the following items of current production: Littlejohn Warheads M146 and M8, and Honest John Warheads M38, M132, and M144. (Author)

23. PERSONNEL AND TRAINING

AD-294 920 Div. 23, 28
(TISTB/CCH) OTS price $8.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
AN EVALUATION OF FOUR METHODS FOR CONVERTING SINGLE AXIS PILOT RATINGS TO MULTI-AXIS PILOT RATINGS USING FIXED BASE SIMULATION DATA.
Master's thesis,
by Vernon Allan Dander. Dec 62, 84p. incl. illus. tables, 11 refs. (Rept. no. GE/EE/62-4)
Unclassified report

DESCRIPTORS: *Personnel management, *Human engineering, Experimental data, Mathematical prediction, Job analysis, Pilots.

Four possible techniques were evaluated for combining single axis pilot ratings to predict a pilot rating for the axes in combination. Two of the methods proved promising, giving good results for the experimental data taken during the study. The first, developed by I. L. Ashkenas, is based on a non-linear relationship between the pilot rating and the pilot lead time-constant. The second, based on the incremental change of pilot rating as the vehicle handling qualities are changed, gives comparable results, but is restricted as to the data to which it can be applied. An attempt to improve the results of the two methods by combining certain features of each proved to be unfruitful. The fourth method, based on the summation of the individual axes ratings, was shown to be useless. (Author)

AD-295 001 Div. 23
(TISTB/DGH) OTS price $4.60

Quartermaster Food and Container Inst. for the Armed Forces, Chicago, Ill.
A QUESTIONNAIRE STUDY OF ARMY MESS PERSONNEL. Interim rept. on Human Factors in QM Corps Operations,
by Jan Eindhoven. Nov 62, 49p. incl. illus. tables (AMXFC-TSO rept. no. 37-62)
(Proj. no. 7-84-15-007)
Unclassified report

DESCRIPTORS: *Food, *Military personnel, *Psychometrics, Officers mess, Military rations, Attitudes, Measurement, Preparation, Acceptability, Galleys, Job analysis.

This study shows the feasibility of using a relatively complex self-administered questionnaire to indagate the attitudes and capabilities of mess personnel. Of greater importance is the data obtained by the questionnaire which, while exploratory in nature, has demonstrated that mess personnel differ considerably in their practices. A certain proportion of the questionnaire items would appear to have face validity, for example, job knowledge and satisfaction with the job should be related directly to the quality of output, food preparation. The relation of other behavioral indices on which mess personnel differ to quality of output is not readily defined. Inasmuch as differences in consumption and quality have been found between messes, it is recommended that further research be conducted to determine the correspondence between mess quality and some of the personnel factors described in this pilot study. (Author)

AD-295 049 Div. 23
(TISTB/DGH) OTS price $6.60

American Inst. for Research, Washington, D. C.
FEASIBILITY OF IDENTIFYING PREDICTORS OF SUCCESS IN OFFICER JOBS FROM PERSONNEL RECORDS AND THE WORD PICTURE SECTION OF EFFECTIVENESS REPORTS.
Final rept.,
by Stanley Lichtenstein and Clifford P. Hahn. Aug 62, 62p. incl. illus. tables, 3 refs.
(Contract AF 41(657)352)
(PRL TDR 62-16) Unclassified report

Division 23 - PERSONNEL AND TRAINING

DESCRIPTORS: *Job analysis, *Officer personnel, Engineering personnel, Scientific personnel, Statistical analysis, Mathematical prediction, Feasibility studies, Personnel, Military requirements, Effectiveness.

To increase the amount of information that can be used in determining desirable job requirements and in evaluating officer performance, two sources were examined for pertinent and scalable variables. From personnel records of officers in the Communications Specialty and the Research & Development career area, 76 variables were identified and scaled. By developing a method for content analysis, information from the Word Picture section of the Officer Effectiveness Reports for the same officers was quantified on 89 scales. Individual data records, score distributions, and intercorrelations of 165 variables for the two samples are available for use in developing qualifications and criteria for jobs in these areas. (Author)

AD-295 182 Div. 23, 28
(TISTB/DGH) OTS price $1.60

Army Personnel Research Office, Office of the Chief Research and Development, Washington, D. C.
CORRELATES OF DISCIPLINARY RECORD IN A WIDE-RANGE SAMPLE,
by Walter A. Klieger, Adrian U. Dubuisson, and Bryan B. Sargent, III. Aug 62, 9p. tables, 9 refs. (Technical research note 125)
(DA Proj. 0J95-60-001) Unclassified report

DESCRIPTORS: *Military personnel, Behavior, Criminology, Classification, Determination, Tests, Selection.

In the development of techniques for the early identification of potentially delinquent soldiers, operational test scores and data on type of discharge and court-martial conviction were obtained on a sample of 875 enlisted men who entered the Army in 1952-53 when AFQT Category IV and V men were being accepted. For purposes of the study, the US (Selective Service inductees) sample and the smaller RA (voluntary enlistees) sample were each divided into two subsamples--AFQT Category I - III and AFQT Category IV and V. AFQT IV and V categories showed significantly greater proportions of men incurring disciplinary action than did AFQT Category III and above. Years of education, the verbal test of the Army Classification Battery, and AFQT were consistently related to the disciplinary criterion in a sample in which all mental categories were represented. Pre-service criminal record was also found to be related to disciplinary action. (Author)

AD-295 183 Div. 23, 28
(TISTB/DGH) OTS price $1.60

Army Personnel Research Office, Office of the Chief, Research and Development, Washington, D. C.
PEER RATINGS AS PREDICTORS OF DISCIPLINARY PROBLEMS,
by Walter A. Klieger, John E. deJung, and Adrian U. Dubuisson. July 62, 12p. tables, 5 refs. (Technical research note 124)
(Proj. 0J95-60-001) Unclassified report

DESCRIPTORS: *Sociometrics, *Military training, Acceptability, Combat, Personality, Employee relations, Classification, Identification, Recruiting, Military personnel, Effectiveness.

Peer and cadre ratings of combat potential made as early as the fifth week of basic combat training showed substantial validity in predicting acceptability (r's in the 30's and 40's). Since the ratings showed higher validity than any of the other experimental predictors, further exploration of their utility for this purpose is desirable. The importance of establishing the validity of ratings for a criterion of acceptability extends well beyond the objective of identifying potential disciplinary cases. Ratings obtained from peers and cadre are a part of procedures to select enlisted men for participation in such Army-wide programs as OCS, NCO academy training, Special Forces, recruiter assignment, and various forms of specialist training. The present finding adds assurance that men being selected for these programs partially on the basis of peer and cadre ratings are good risks from a disciplinary standpoint. The RA Caucasian subsamples (combat and noncombat) were found to have proportionally larger numbers of men receiving other-than-honorable discharges and/or court-martial convictions than corresponding US Caucasian subsamples. Similar comparisons of smaller RA and US Negro subsamples did not show significant differences. Results obtained suggest that differences in education partially account for the RA-US differences found. (Author)

AD-295 184 Div. 23
(TISTB/DGH) OTS price $4.60

Army Personnel Research Office, Office of the Chief Research and Development, Washington, D. C.
ABSTRACTS OF USAPRO RESEARCH PUBLICATIONS -- FY 1962,
by Emma E. Brown and Harry Kaplan. June 62, 38p. (Technical research note 123)
(Proj. 0J95-60-001)
Unclassified report

DESCRIPTORS: *Military personnel, *Military psychology, Recruiting, Identification, Officer personnel, Classification, Research program administration.

AD-295 185 Div. 23
(TISTB/DGH) OTS price $1.10

Army Personnel Research Office, Office of the Chief Research and Development, Washington, D. C.
SELECTION OF NCO LEADERS -- STATUS REPORT, 30 JUNE 1962,
by Francis F. Medland, Charles H. Hammer, and Eli Frankfeldt. June 62, 7p. 8 refs. (Technical research rept. 1127)
(Proj. 0J95-60-001)
Unclassified report

DESCRIPTORS: *Officer personnel, *Recruiting, Military training, Acceptability, Effectiveness, Selection, Leadership.

DCSPER has a requirement for techniques to identify early in their careers those enlisted men who are capable of becoming good noncommissioned officers in the combat branches. Research is being conducted to develop a two-stage screening procedure: (1) preliminary screening to identify upon entrance into the Army those men with greatest likelihood of developing noncommissioned officer abilities, and (2) selection techniques for use with enlisted men after they have had Army training and experience to identify those most likely to become good combat NCOs. An experimental battery for early identification of potential leaders has been constructed and is being field validated. Initial data on a longitudinal sample have been collected. The Army NCO academy system has been selected as the framework

for research on the measurement of leadership performance. A survey of NCO academies was completed and initial coordination effected. One experimental measure -- a peer rating of 'Acceptance as a Leader' -- is being used operationally at training centers to select basic trainees to attend NCO preparatory training course. The standardized selection and evaluation procedures toward which NCO Leaders research is directed will provide a means of improving the quality of NCO leadership and at the same time will enhance the prestige of NCO leader positions. (Author)

AD-295 187 Div. 23, 28
(TISTB/DGH) OTS price $1.60

Army Personnel Research Office, Office of the Chief Research and Development, Washington, D. C.
METHODS FOR IMPROVING ENLISTED INPUT--STATUS REPORT, 30 JUNE 1962,
by A. G. Bayroff. June 62, 9p. 18 refs.
(Technical research rept. 1125)
(DA Proj. 0J95-60-001)
Unclassified report

DESCRIPTORS: *Military personnel, *Recruiting, Aptitude tests, Standardization, Selection, Effectiveness.

During FY 1962, research was conducted on the following phases of input screening: (1) evaluation of the effectiveness of the interim form of a differential ability test battery for input screening, the Army Qualification Battery AQB02; (2) standardization of new tests constructed for the Army Qualification Battery; (3) construction and standardization of Women's Army Classification Battery; standardization of Armed Forces Women's Selection Test (jointly with Air Force); (4) exploring feasibility of new testing techniques; (5) devising a feasible method of estimating the mental abilities in the civilian manpower pool eligible for military service (initial planning phase); and (6) sampling current AFQT data. Differential aptitude measures provided by AQB-1 were found to be satisfactorily related to their aptitude area counterparts based on tests of the Army Classification Battery (ACB). Experimental AQB tests were substantially correlated with ACB counterpart tests. Of experimental test techniques, the most promising was a method for developing very short (8-item) tests to predict pass-fail AFQT within a narrow ability range. The Army Qualification Battery (AQB-1) was introduced at Armed Forces Examining Stations in September 1961. Short, limited-range tests may be developed by USAPRO scientists as substitutes for the Enlistment Screening Test for quick estimation of eligibility. AFWST 5 and 6 and WEST 3 and 4 were implemented by the Army 1 December 1961 for screening applicants for the Women's Army Corps. The WACB was implemented 11 September 1961. (Author)

AD-295 188 Div. 23, 28
(TISTB/DGH) OTS price $1.60

Army Personnel Research Office, Office of the Chief Research and Development, Washington, D. C
SELECTION OF ANTI-TANK MISSILE GUNNERS -- STATUS REPORT, 30 JUNE 1962,
by Martin F. Wiskoff. June 62, 17p. 2 refs.
(Technical research rept. 1128)
(DA Proj. 0J95-60-001)
Unclassified report

DESCRIPTORS: *Guided missile personnel, *Gunnery, Antitank guns, Guided missile batteries, Training, Selection, Personnel.

The selection of men for SS-10/11 training scheduled to begin in January 1960 in the interest of improving gunner trainee proficiency is discussed. A preliminary battery was selected from a large number of experimental instruments. To select a final battery, realistic criterion measures of gunner performance were developed through consideration of varying difficulty of environmental conditions at time of missile firing. Three tests were selected to make up the preliminary battery for selection of gunner trainees: Pattern Analysis of the Army Classification Battery, Coordinate Movements, and Locations (double weighted). Predictor and gunner performance criterion data have been obtained for a more comprehensive validation study of experimental measures. Data are now being analyzed to identify the most effective predictors for a final selection battery. A preliminary battery was used to select gunner trainees for eight 1960 classes in the operation of SS-10 weapons systems. Cross-validation of the battery selected as a result of the present study is desirable in order that a means of selecting gunner trainees may be available if need arises. (Author)

AD-295 189 Div. 23, 28
(TISTB/DGH) OTS price $1.60

Army Personnel Research Office, Office of the Chief, Research and Development, Washington, D. C.
NEW CLASSIFICATION TECHNIQUES--STATUS REPORT, 30 JUNE 1962,
by William H. Helme and Lawrence K. Waters. June 62, 14p. tables (Technical research rept. 1126)
(Proj. 0J95-60-001) Unclassified report

DESCRIPTORS: *Military personnel, Theory, Classification.

New Classification Techniques research is currently being conducted in: (1) improving differential classification by improving the Army Classification Battery; (2) identification and utilization of potential career enlisted men; (3) screening and assignment of lower mental category enlisted men; and (4) physical proficiency measures to classify enlisted men for Military Occupational Specialties with given physical performance demands. Updated new alternate forms of Automotive Information and Army Clerical Speed tests were developed, and, in a standardization run, found to be satisfactory replacement forms. A Tool Knowledge test and two Trade Knowledge tests, all designed to afford better differential prediction within the broad mechanical domain, have been constructed. Two information tests, Biochem Information and Chemical Information, were prepared for differentiating prediction of performance in medical and chemical MOS from other MOS selected on the General Technical Aptitude Area. A series of personality and interest tests have also progressed to final validation stage. In research to predict reenlistment, an instrument was developed and validated on intention to reenlist expressed at entry into service, correlating .52 with intention at entry and .22 with reenlistment intention after one year. Two large samples of AFQT Category IV men are being analyzed to determine what screening and classification measures are effective in predicting Army job performance with men of this caliber. (Author)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-295 446 Div. 24, 25
(TISTA/VGW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
FIVE-LENS OBJECTIVE WITH HIGH F NUMBER,
by M. D. Mal'tsev. 12 Dec 62, 4p. incl. illus. (Trans. no. FTD-TT-62-1508 from Russian Patent no. 141654(685253/26), pp. 1-2, 1960)
Unclassified report

DESCRIPTORS: *Photographic lenses, *Optical systems, USSR, Design.

A five-lens objective with high f number with relative aperture 2-2.5, covering a frame 24 x 36 mm, with insignificant vignetting of the edges of the margin, is distinguished by the fact that for the purpose of simplifying the design there was developed a new type of objective, consisting of five lenses, grouped in three components: first, one meniscus positive lens, and second and third, two lenses each, one of which is positive and the other negative, whereby the negative lenses are turned towards the aperture diaphragm, placed between the second and third components. (Author)

AD-295 460 Div. 24, 25
(TISTA/VGW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
WIDE-ANGLE, WIDE-APERTURE OBJECTIVE, THE ''KINO-RUSSAR 7''
by M. I. Kuz'mina and M. M. Rusinov. 12 Dec 62, 3p. incl. illus. (Trans. no. FTD-TT-62-1509 from Russian Patent No. 141655 (689078/26) pp. 1-2, 1960)
Unclassified report

DESCRIPTORS: *Photographic lenses, *Optical systems, *Inventions, *Motion picture cameras, Translations, Wide-field cameras, Design, USSR, Lenses.

A wide-angle, wide-aperture objective, the Kino Russar 7 with a focal length of 22.5 mm, a relative aperture of 1:3.5, and an angle of the field of vision of 108 degrees, utilizes as the exterior component a telescopic system with angular magnification of 0.5 consisting of two negative meniscuses with spherical surfaces; a five-lens objective of the Gauss type is used as the internal component. (Author)

AD-295 990 Div. 24, 26
(TISTW/JEA) OTS price $2.60

Bell and Howell Co., Chicago, Ill.
ASPHERIC OPTICAL ELEMENTS PROGRAM.
Interim technical rept. no. 14, 1 Oct-31 Dec 62, by Marvin Royston, Du Wayne Stevens and others. 31 Dec 62, 21p. incl. illus. table.
(Contract AF 33(600)37199)
Unclassified report

DESCRIPTORS: *Aspherical lenses, *Optical systems, *Machine translation, Photographic lenses, Machining, Mechanical drives, Photography, Pulse ratio indicators, Pulse generators, Programming, Processing, Grinders, Errors, Multiple operations, Triggered gates, Time interval counters, Trigger circuits, Synchros, Glass, Computer logic, Precision finishing, Surfaces, Manufacturing methods, Design, Production, Computers.

25. PHYSICS

AD-294 950 Div. 25, 17
(TISTM/ODN) OTS price $1.25

Massachusetts Inst. of Tech., Cambridge.
DYNAMICS OF WETTING IN BRAZING AND SOLDERING,
by Clyde M. Adams, Jr. July 62, 24p. illus. tables, ref.
(Contract DA 19-020-505-ORD-4917, Proj. 5B93-32-003)
(WAL TR 650/1) Unclassified report

DESCRIPTORS: *Brazing, *Soldering, Liquid metals, Metals, Vacuum furnaces, Alloys, Silver solders, Melting, Fluid flow, Tin, Copper, Tin alloys, Copper alloys, Silver alloys, Graphite, Surface properties, Surfaces.

The spreading by wetting of some liquid metals on substantially clean solid surfaces is a two speed process with the rate of spreading related to contact angle, oxygen traces, and solid state surface alloying. (Author)

AD-294 981 Div. 25
(TISTP/JW) OTS price $1.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
MACROSCOPIC EQUATIONS GOVERNING THE INTERACTION OF ELECTROMAGNETIC WAVES WITH NON-UNIFORM PLASMA FLOWS,
by K. T. Yen. Sep 62, 10p. 9 refs. (Rept. no. R62SD14)
(Contract AF 30(602)1968)
Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Plasma physics, Microwaves, Diffusion, Ionization, Propagation, Gases, Equations, Fluid flow.

A method of analysis for the interaction between electromagnetic waves and a non-uniform plasma flow is presented. The electromagnetic waves are taken to be in the microwave range. By using a fully-ionized gas as a model, two coupled sets of macroscopic equations are obtained: the flow equations and the field equations. Special consideration is given to the case where diffusion and charge separation can be disregarded. It is shown that both sets of equations can be reduced to useful forms. Physical significance of these equations and extension of this method to include charge separation and partially ionized plasmas are briefly discussed. (Author)

AD-294 982 Div. 25, 9
(TISTP/JW) OTS price $5.60

Space Sciences Lab., General Electric Co. Philadelphia, Pa.
THE HYPERSONIC ENVIRONMENT--HEAT TRANSFER IN MULTICOMPONENT GASES,
by Sinclaire M. Scala. Dec 62, 49p. illus. 110 refs. (Rept. no. R62SD987)
Unclassified report

DESCRIPTORS: *Heat transfer, High temperature research, Atmosphere, Quantum mechanics, Fluid flow, Gases, Hypersonics.

The prediction of heat transfer in the high temperature hypersonic flight regime continues to be a challenging problem, particularly with the increasing need to understand the phenomena from a microscopic viewpoint. In this review paper, the general hypersonic heat transfer problem, for an arbitrary planetary atmosphere, is introduced by classifying the various regimes of interest. Recent developments in each of these regimes, ranging through the free molecule, near free molecule, low Reynolds number and high Reynolds number regimes are considered. Some of the latest techniques for predicting aerodynamic and radiative heat transfer are discussed, and uncertainties are pointed out. Throughout the paper, special emphasis has been placed on a discussion of thermophysical phenomena, which points out the need for the introduction classical, statistical and quantum mechanical approaches to the development of realistic models for the hypersonic interaction problem. (Author)

AD-294 984 Div. 25
(TISTP/TL) OTS price $8.10

Naval Ordnance Lab., White Oak, Md.
EXTINCTION OF LIGHT AT NORMAL INCIDENCE BY DIELECTRIC CYLINDERS WITH REFRACTIVE INDEX IN THE RANGE M EQUALS 1.15 TO M EQUALS 1.30 SCATTERING COEFFICIENTS,
by Louis F. Libelo. 31 Aug 62, 85p. incl. tables (Rept. no. NOLTR 62-157)
Unclassified report

DESCRIPTORS: *Light, *Electromagnetic waves, *Dielectrics, Numerical analysis, Real variables, Tables, Polarization, Wire, Gold wire, Special functions, Magnetic fields, Refractive index, Scattering, Cylindrical bodies.

Presented are tables of the complex scattering coefficients for the problem of scattering of normally incident linearly polarized plane electromagnetic waves by dielectric infinite circular cylinders. The numerical results were obtained by means of the IBM 7090 computer system. Contained in the tables are the scattering coefficients for the incident plane wave polarized parallel to the cylinder axis and also those for the incident plane wave polarized normal to the cylinder axis. The extent of the tables are as follows: for refractive indices m=1.15 and m=1.30 the circumference to wave length ratio x=2 pi a/lambda extends over the range 0.100(0.200)13.500. For refractive indices m=1.20 and m=1.25 the range in x is 0.100(0.200)13.300. The rather extensive results tabulated are compared where possible, with those somewhat more limited ones obtained by other investigators. (Author)

AD-294 986 Div. 25, 15
(TISTW/PCR) OTS price $2.60

Rome U. (Italy).
RADIATION WITH TEMPERATURE DEPENDENT THERMAL PROPERTIES,
by Luigi Broglio. Apr 62, 1v. incl. illus. 4 refs. (Technical note no. 7; SIARgraph no. 65)
(Contract AF 61(052)198)
Unclassified report

DESCRIPTORS: *Thermal radiation, Italy, Thermal conductivity, Thermal diffusion, Configuration, Spheres, Equations, Integral equations, Theory, Green's function, Matrix algebra, Functions, Fourier analysis, Temperature, Mathematical analysis.

The problem of radiation from a generic body with variable thermal coefficients is considered and a general equation of Volterra's type is derived. Explicit expression is also given for the spherical shell; whence he solid sphere, the flat plate, and the indefinite body can be studied. Also, a practical solution for numerical application is devised. In part II the theory is applied to particular laws of variation of thermal coefficients, and the effect of such coefficients is investigated. (Author)

Division 25 - PHYSICS

AD-294 991 Div. 25, 15
(TISTP/JW) OTS price $3.60

Oceanics, Inc., Plainview, N. Y.
FORCES ON A HOVERING SLENDER BODY OF REVOLUTION SUBMERGED UNDER WAVES OF MODERATE WAVELENGTH,
by Theodore R. Goodman. Nov 62, 33p. incl. illus. table, 9 refs. (Rept. no. 63-02)
(Contract NObs-86514)
Unclassified report

DESCRIPTORS: *Bodies of revolution, Velocity, Perturbation theory, Fluid flow, Motion, Oscillation, Equations, Particles, Underwater, Wave characteristics.

The forces on a slender body of revolution hovering under waves are determined. It is assumed in the analysis that the wavelength is of the same order of magnitude as the body radius, i.e., kR=0(1), where k is the wave number and R is the body radius. Two cases are considered: beam seas and head seas. It is shown that for head seas conventional slender body theory is inadequate and, for this case, a generalization of slender body theory is developed. (Author)

AD-294 998 Div. 25
(TISTM/EJH) OTS price $1.10

Syracuse U. Research Inst., N. Y.
A STUDY OF MATERIALS FOR IR DETECTORS.
Semiannual rept. no. 2,
by Joseph Wrobel and Frank Renda. 20 Jan 63, 3p. illus.
(Contract AF 33(657)7590)
Unclassified report

DESCRIPTORS: *Photosensitivity, *Infrared detectors, Infrared optical materials, Indium alloys, Gallium alloys, Antimony alloys, Crystals, Preparation, Impurities, Cooling, Infrared radiation, Materials.

Photoconductivity studies in the In-Ga-Sb system were begun in hope of finding a long wavelength absorption threshold similar to solutions of InSb and GaSb. Homogeneous ingots of the polycrystalline alloy were obtained by mixing pure InSb and GaSb in a 7:1 ratio. After quenching and zone leveling at a rate of 1/2 in. per day, 3cu mm samples were prepared. While the photosensitivity obtained in the 3-5 micron region was encouraging, a useful detector will require less cooling. As liquid He was required for cooling the samples, it is assumed that a shallow impurity produced a large number of charge carriers only frozen out at the liquid He temperature. Resistance and Hall constant vs temperature measurements indicate an impurity level with activation energy of .01 ev and ''p'' impurities. It will be necessary to find an ''n'' type impurity with a low vapor pressure to effect exact compensation of the 0.01 impurity level.

AD-295 029 Div. 25, 17
(TISTM/ODN) OTS price $1.00

Defense Metals Information Center, Columbus, Ohio.
ELECTRON MICROSCOPIC FRACTOGRAPHY,
by W. R. Warke and A. R. Elsea. 21 Dec 62, 32p. incl. illus. 35 refs. (DMIC memo. no. 161)
(Contract AF 33(616)7747, Proj. 2(8-8975))
Unclassified report

DESCRIPTORS: *Electron microscopy, *Steel, *Stainless steel, *Alloys, *Fractography, Surfaces, Fracture (Mechanics), Electron microscopes, Hydrogen embrittlement, Iron, Aluminum alloys, Grains (Metallurgy), Stresses, ~~Fractography.~~

Because of its greater depth of focus the electron microscope is more suited for fractography than is the light microscope. Since the electron microscope has become a rather common instrument in modern metallurgical laboratories, interest in fractography has revived. Although some fractographic work is still done with the light microscope, much of the effort has involved the use of the electron microscope and electron microscopic fractography has become a highly reliable tool in the hands of those experienced in its use. This memorandum defines those areas of application where electron microscopic fractography is being used, and also those areas where limitations and lack of knowledge exist, thus should help stimulate further advances in this field. (Author)

AD-295 047 Div. 25
(TISTA/GEC) OTS price $7.60

Israel Inst. of Tech., Haifa.
BUCKLING OF CONICAL SHELLS UNDER EXTERNAL PRESSURE, TORSION AND AXIAL COMPRESSION.
Technical rept.,
by Josef Singer, Abraham Eckstein, and Menahem Baruch. Sep 62, 1v. incl. illus. tables, refs. (TAE rept. no. 19)
(Contract AF 61(052)339)
Unclassified report

DESCRIPTORS: *Conical bodies, Deformation, Pressure, Torque, Thermal stresses, Load distribution, Test methods, Tests, Mathematical analysis, Elasticity, Structural shells.

A method for the analysis of the instability of thin conical shells under external pressure is extended to buckling under torsion and combined torsion and external or internal pressure as well as axisymmetric temperature distributions. The method is based on solution of modified Donnell type stability equations, in the presence of slightly relaxed boundary conditions for the u and v displacements. Two formulations of the solution for torsion and combined loadings are given and compared. For conical shells of small and medium taper ratio, the interaction curves may be approximated by the semi-empirical curve of Crate, Batdorf and Baab (The Effect of Internal Pressure on The Buckling Stress of Thin Walled Circular Cylinders Under Torsion, NACA AAR No. 14E27, May 1944) for cylindrical shells, but for large taper ratio different curves are obtained. Tests of 33 steel, Alclad, and Al alloy conical shells of varying geometries are described. The buckling and postbuckling behavior and the effect of initial out-of-roundness are discussed. The results of another experimental program on the instability of thin truncated conical shells in torsion and under the combined loading of external pressure and torsion are given, and compared with theory. (Author)

AD-295 070 Div. 25
(TISTP/JW) OTS price $3.60

National Technical U. (Greece).
DIFFUSED LIGHT INTERFEROMETRY FOR MEASUREMENT OF ISOPACHICS,
by Pericles S. Theocaris. 1962, 14p. illus. 23 refs.
(Contract DA 91-591-EUC-2021)
Unclassified report

DESCRIPTORS: *Light, *Optics, Surfaces, Density, Measurement, Diffusion, Interferometers.

A simplified optical method, based on interference phenomena of diffused light, is described for the determination of isopachic patterns. Procedure consists in using a monochromatic diffused light beam to illuminate the model surface. If an optically flat glass plate, used as datum plane, is brought in contact with the model front surface an interference pattern is produced related to the thickness of the air-film between the datum plane and the surface of the model. Interference patterns before and after loading of the specimen allow the determination of isopachics. Curves of variation of interference fringes throughout the surface of the specimen, before their use for the determination of thickness variation, must be readjusted in convenient scale as well as for the elimination of superimposed simple interference patterns due to arbitrary inclination of the datum optical plane before and after loading. The method does not necessitate a complicated equipment. It is straightforward and very sensitive, and can be applied to transparent as well as to opaque models made of metal sheets. (Author)

AD-295 075 Div. 25, 20
(TISTP/JW) OTS price $4.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
ON THE THEORY OF RADIATION FROM SOURCES IN PLANE STRATIFIED ANISOTROPIC PLASMA MEDIA,
by E. Arbel and L. B. Felsen. 25 Sep 62, 41p. incl. illus. table, 35 refs. (Research rept. no. PIBMRI-1069-62)
(Contract AF 19(604)4143, Proj. 5635)
(AFCRL 62-760) Unclassified report

DESCRIPTORS: *Radiation effects, *Wave characteristics, Fluid flow, Energy, Refraction, Ionization, Magnetic field, Plasma physics, Analysis.

The radiation from arbitrary source distributions in plane stratified, anisotropic media is presented. The formal solutions are obtained by an extension of modal procedures familiar from the analysis of isotropic waveguide regions. Special attention is given to the formulation of a radiation condition which requires the flow of energy away from the sources, and to its interpretation utilizing the refractive index surfaces descriptive of plane wave propagation in an anisotropic medium. These concepts are illustrated in detail for an ionized plasma under the influence of an external steady magnetic field. (Author)

AD-295 086 Div. 25
(TISTM/EJH) OTS price $1.60

RIAS, Inc., Baltimore, Md.
FAULTING IN SODIUM AZIDE,
by Henry M. Otte. Dec 62, 5p. tables, 6 refs.
(Technical rept. no. 4)
(Contract Nonr-370600)
Unclassified report

DESCRIPTORS: *Deformation, *Sodium compounds, *Azides, X-ray diffraction analysis, Crystals, Lattices.

This report includes:
MEASUREMENT OF STACKING FAULT PROBABILITIES IN BULK SPECIMENS, by Henry M. Otte, D. O. Welch and G. F. Bolling.

In x-ray diffraction measurements of NaN_3 it has been noted that after deformation, the line broadening was consistent with that expected from formation of deformation stacking faults. However, the anticipated shifts in the peak positions could not be detected. An explanation for this is suggested on the basis of the supposition that (1) extrinsic stacking faults are at least as likely to form in NaN_3 as intrinsic stacking faults and (2) x-ray diffraction analysis for extrinsic stacking faults is applicable. (Author)

AD-295 092 Div. 25, 8
(TISTP/WH) OTS price $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
INCOHERENT SCATTERING FROM A PLASMA. I. THE ELECTRONIC SPECTRUM. II. THE ION-CARRIED ELECTRONIC SPECTRUM,
by M. S. Cackrakis. 14 Nov 62, 15 refs. (Technical rept. no. 287)
(Contract AF 19(628)500)
(AFESD TDR 62-266) Unclassified report

DESCRIPTORS: *Plasma physics, *Electrical networks, *Scattering, *Ionic current, Electric fields, Density, Synthesis, Transport properties, Ions.

The purpose of this analysis is twofold: (1) to review some aspects of the theory on density fluctuations in a plasma (Part 1) and (2) to introduce a novel method for the determination of the fluctuation spectrum of a multicomponent plasma (Part II). Part I attempts to follow the theory that starts from first principles (dynamics of point-charged particles) and leads to the derivation of coarse-grained properties of a plasma in order to compute the response of the plasma to an externally applied longitudinal field. By applying the Nyquist theorem to the response function of the system, we derive the fluctuation spectrum. Part II introduces a technique by which the space and time-dispersive response function of a plasma that has an arbitrary number of charged constituents can be evaluated with little effort. The technique consists of reducing the problem to one in network theory. The network corresponding to a plasma is a bank of capacitors in paralled, with each capacitor representing one constituent of the plasma. A plier's entry at any desired location in the network determines the response function to an applied external potential. (Author)

AD-295 196 Div. 25, 12
(TISTP/JW) OTS price $3.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
A THEORETICAL STUDY OF THE MODIFICATION IN ECHO AREA OF SPACE VEHICLES DUE TO THEIR LOCAL SPACE ENVIRONMENT.
Quarterly status rept., 1 Sep-30 Nov 61. 1 Dec 61, 31p. incl. illus. 21 refs. (Rept. no. 1116-15)
(Contract AF 19(604)7270)
Unclassified report

DESCRIPTORS: *Space environmental conditions, *Radar echo areas, Spaceships, Ionization, Ionosphere, Echo ranging, Plasma physics.

The change in the radar echo area of a satellite due to the plasma sheath and the density and duration of satellite induced ionization are investigated. (Author)

AD-295 409 Div. 25, 30
(TISTP/JEA) OTS price $3.60

Institute of Engineering Research, U. of Calif., Berkeley, Calif.
ON THE MOLECULAR INTERACTIONS BETWEEN GASES

AND SOLIDS,
by F. C. Hurlbut. 15 Nov 62, 21p. incl. illus. tables, 48 refs. (Technical rept. no. HE-150-208; Series no. 20, Issue no. 142)
(Contract Nonr-22245)
Unclassified report

DESCRIPTORS: *Molecules, *Gases, *Crystals, Gas ionization, Gas flow, Gas diffusion, Particles, Degasification, Theory, Electron beams, High temperature research, Alkali metal compounds, Thermal conductivity, Energy, Temperature, Detectors, Chemical elements, Diffusion, Adsorption, Ion beams, Ion sources, Crystallization, Diffraction, Chemical reactions, Reaction kinetics, Scattering.

Problems of energy and momentum transfer between the gas particle and the surface are examined with attention given to those processes which directly influence the flow under free molecule and near free molecule conditions. A review of early and also very recent scattering studies reveals consistent trends in the reflected angular distribution in particle flux from cleaved and degassed alkali halide crystals and from certain degassed metal surfaces. These observations lend support to a dynamical model of the lattice in interaction with the gas particle. In connection with the discussion of this model three broad regimes of interaction in the presence of attractive forces are defined. (Author)

AD-295 410 Div. 25, 30
(TISTP/JEA) OTS price $5.60

Electro-Optical Systems, Inc., Pasadena, Calif.
THERMAL RADIATION GUIDES FOR POWER TRANSMISSION.
Quarterly technical progress rept. no. 3, 1 Oct-31 Dec 62,
by W. J. Swenson. 15 Jan 63, 48p. incl. illus.
(EOS rept. no. 3000-Q-3)
(Contract AF 33(657)8526, Proj. 8128)
Unclassified report

DESCRIPTORS: *Thermal radiation, *Solar energy, *Thermodynamics, Radiation effects, Absorption, Curved mirrors, Solar cells, Temperature, Light transmission, Corrosion, Calorimeters, Energy, Spaceships, Coatings, Absorption, Heat production, Power, Transmission, Optical systems, Analysis.

Research progress is directed towards achieving a fundamental advance in the state of the art of energy transmission in spacecraft by a technique heretofore unexplored for this purpose. The technique discussed involves the transmission of radiant energy through a hollow, reflective tube from a heat source to some other location in a spacecraft without intermediate Carnot cycle limited conversion process. This technique is particularly useful for applications in which a significant portion of the total energy requirement is in the form of thermal energy. (Author)

AD-295 413 Div. 25, 30
(TISTP/JEA) OTS price $1.60

Aerojet-General Corp., Azusa, Calif.
CRYOGENIC-SOLID COOLING TECHNIQUES.
Interim engineering rept. 1 Oct-31 Dec 62,
by U. E. Gross. Jan 63, 7p. illus. (Rept. no 0694-01-2)
(Contract AF 33(657)8863)
Unclassified report

DESCRIPTORS: *Cryogenics, Temperature control, *Pressure regulators, Cooling, Measurement, Insulating materials, Low temperature research, High pressure research, Superconductivity, Solids, Methanes, Solidified gases, Liquefied gases, Heat transfer, Control systems.

Evaluation of the experimental model of the cryogenic-solid cooling system, with subsequent modification and testing, is reported. Advancements in the investigation of cryogenic-coolant solidification techniques and continued efforts in the development of temperature and pressure control methods are also described. Conclusions and recommendations are made, based upon the program of work performed to date. (Author)

AD-295 429 Div. 25, 9
(TISTP/WH) OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
TYPICAL VALUES OF PLASMA PARAMETERS AROUND A CONICAL RE-ENTRY VEHICLE,
by D. M. Dix. 7 Nov 62, 15p. incl. illus. 13 refs. (Rept. no. TDR-169(3230-22)TN-1)
(Contract AF 04(695)169)
(SSD TDR-62-158) Unclassified report

DESCRIPTORS: *Blunt bodies, *Re-entry vehicles, *Plasma physics, Conical bodies, Aerodynamics, Laminar boundary layer.

The characteristics of the plasma around a slender, slightly blunted cone during re-entry are discussed in relation to the plasma sheath transmission problem. The flow field around the forementioned vehicle is qualitatively described, and the plasma and collision frequency distribution around a perfectly sharp cone during re-entry is presented graphically. The methods employed in computing the presented values of the plasma parameters are outlined and referenced in the appendix. (Author)

AD-295 431 Div. 25
(TISTE/JEA) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PHOTOELECTRIC DEVICE FOR ESTABLISHING IDENTICALNESS OF TEXT AND ILLUSTRATION ORIGINALS, FOR EXAMPLE, GEOGRAPHICAL MAPS AND REPRODUCTIONS OF THE LATTER,
by D. N. Chekalov, M. A. Matveyeva and others.
11 Dec 62, 14p. incl. illus. (Trans. no. FTD-TT-62-1507 from Russian Patent no. 141502 (660295/28, pp. 1-9, 28 Mar 60)
Unclassified report

DESCRIPTORS: *Photoelectric cells, *Photoelectric effect, *Maps, Power transformers, Sensitivity, Semiconductors, USSR, Light transmission, Circuits, Magnetic fields, Design, Capacitance bridges, Limiters, Sonar signals, Reproduction.

The known photoelectric devices for establishing the identicalness of text and illustration originals, for example, geographic maps, and reproductions of the latter are not very effective and prove to be very time-consuming and tiring. A proposed device is designed in the form of two photoelectric heads, a modulator of voltage, an electron amplifier of alternating current, a phase-sensitive circuit, an electron unit of comparison, and a system of light and sound signaling. This makes it possible to eliminate the laborious visual process and it heightens the precision of the collation. (Author)

AD-295 441 Div. 25
(TISTW/JEA) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE ELECTRICAL CONDUCTIVITY OF SOLID OXIDE SYSTEMS. II. THE SYSTEM ZrO2-CaO. ELECTRICAL CONDUCTIVITY AND TRANSPORT NUMBERS,
by Z. S. Volchenkova and S. F. Pal'guyev. 28 Nov 62, 17p. incl. illus. tables, 12 refs. (Trans. no. FTD-TT-62-1275 from Russian Trudy, Elektrokhimiya Rasplavlennykh Solevykh i Tverdykh Elektrolitov, Trudy Instituta Elektrokhimii, AN SSSR, No. 1, pp. 119-126, 1960)
Unclassified report

DESCRIPTORS: *Electrical conductance, *Thermal conductivity, Temperature, Ranges, Spectrographic analysis, High temperature research, Electrochemistry, Ions, Low temperature research, Zirconium compounds, Ionization potential, Ceramic materials, Oxides, Solids, USSR, Calcium compounds, Solidified gases, Energy.

Measurements are made of electrical conductivities over a broad range of compositions and temperatures and are verified by direct measurements (by determination of the transport numbers). The temperature dependences of the electrical conductivity of solid samples over a range of compositions from pure zirconium dioxide to pure calcium oxide in the range of temperatures from 300 to 1000 degrees were investigated and the transport numbers of samples of a number of compositions were studied. (Author)

AD-295 442 Div. 25, 15
(TISTW/JEA) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INVESTIGATING THE STABILITY OF A RIBBED CYLINDRICAL SHEEL DURING LONGITUDINAL COMPRESSION,
by I. Ya. Amiro. 17 Dec 62, 13p. incl. illus. tables, 3 refs. (Trans. no. FTD-TT-62-1622 from Ukrainian periodical, Prikladna Mekhanika, 6:3, pp. 272-280, 1960)
Unclassified report

DESCRIPTORS: *Cylindrical bodies, *Structural shells, Stresses, Reinforced flanges, Deformation, Diaphragms (Mechanics), Partial differential equations, Energy, Stiffened cylinders, Compression shock, Differential equations, Differential cross sections, USSR, Stability, Stability (Longitudinal).

The critical stresses for a ribbed cylindrical shell are here designated with consideration of discrete arrangement of reinforcing ribs. This offers the possibility of examining also such types of stability losses in which the ribs only bend or are only twisted, or those which cannot be investigated by bringing the problem down to the calculation of a structurally-orthotropic shell. The problem of the critical longitudinal stresses is solved approximately by an energy method. It is considered that for cylindrical shells reinforced by ribs, the critical stresses from total loss in stability can be obtained from the viewpoint of small deformations. (Author)

AD-295 453 Div. 25
(TISTW/RD) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
COLLECTION OF SCIENTIFIC PAPERS, HEAT POWER ENGINEERING (SELECTED ARTICLES),
by L. I. Kudryashev and L. I. Zhemkov. 9 Jan 63, 37p. refs. (Trans. no. FTD-TT-62-1200 from Sbornik Nauchnykh Trudov, Teplotekhnika, Kuybyshev, No. 8, pp. 3-17, 19-22, 23-29, 1959)
Unclassified report

DESCRIPTORS: *Thermal conductivity, *Specific heat, *Thermodynamics, *Heat transfer, Partial differential equations, Thermocouples, Differential equations, Steel, Graphite, Temperature, Mathematical analysis, Theory.

Contents:
Generalization of the theory of regular thermal regime for the case of variable coefficients of heat conductivity and specific heat
Regular heat regime in bodies with internal sources of energy and variable thermophysical properties
Generalization of G. M. Kondrat'ev's theorem for the case of variable coefficients of heat conductivity and specific heat and the use of this generalized theorem to determine thermophsyical properties of materials

AD-295 454 Div. 25
(TISTM/ODN) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE SENSITIVITY OF OZONE-OXYGEN SOLUTIONS TO A PRESSURE PULSE,
by Z. B. Basyrov and A. V. Pankratov. 26 Dec 62, 7p. incl. illus. 12 refs. (Trans. no. FTD-TT-62-1460 from Khimicheskaya Promyshlennost', No. 3, pp. 22-23, 1962)
Unclassified report

DESCRIPTORS: *Ozone, *Oxygen, *Liquefied gases, Sensitivity, Shock waves, Rupture, Shock tubes, Pressure, USSR, Explosions, Solutions.

Determination of the sensitivity of ozone-oxygen solutions to a pressure pulse is considered. The experiments were conducted on an apparatus, the basic element of which was an explosion vessel--a tube 20 mm in diameter and 400 mm in length. A shock tube (diameter 20 mm, length 1080 mm), which was divided into two unequal sections by a rupture diaphragm, was inserted into the enlarged upper section of the vessel. The results obtained show that ozone-oxygen solutions possess a very high sensitivity to pressure pulses. The dilution of liquid ozone with oxygen leads to a sharp decrease in the pressure pulse necessary to excite an explosion in the solution. The dependence found may be expressed by an exponential equation. (Author)

AD-295 459 Div. 25
(TISTM/ODN) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A DETERMINATION OF THE TEMPERATURE FIELD AND THE HEAT LOSSES IN THE INSULATION BARRIER OF COMPRESSED-GAS TANKS,
by S. M. Rips. 19 Dec 62, 21p. incl. illus. tables (Trans. no. FTD-TT-62-1459 from Khimicheskaya Promyshlennost', No. 2, pp. 59-65, 1962)
Unclassified report

DESCRIPTORS: *Gas cylinders, *Gases, Thermodynamics, Liquefied gases, Nitrogen, Oxygen, Hydrogen, Temperature, USSR, Insulating materials, Heat transfer.

On the basis of an investigation of the temperature field in various types of insulation, heat

flows (cold losses) are determined both during the cooling of the tank insulation (nonsteady state) as well as after the temperature field has been established. Illustrative examples are given of the calculation for liquid oxygen, nitrogen, and hydrogen. The proposed method of calculation can be successfully applied to insulation barriers for any other compressed gases. (Author)

AD-295 461 Div. 25
(TISTP/JEA) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DEVICE FOR MEASURING THE ABSOLUTE COEFFICIENTS OF MIRROR REFLECTION,
by O. A. Motovilov. 12 Dec 62, 3p. incl. illus. (Trans. no. FTD-TT-62-1510 from Russian Patent No. 141658 (689143/28) pp. 1-2, 1960)
Unclassified report

DESCRIPTORS: *Optical instruments, *Mirrors, Light transmission, Sensitivity, Errors, Prisms, USSR, Optical analysis, Optical systems, Reflectors, Reflection.

A device is proposed where there is set up for the mirror to be measured the prism Dove-D, which turns the light beam. This enables one to increase the precision in determining the absolute coefficients of mirror reflection and eliminate the error introduced by the turning of the beam. (Author)

AD-295 494 Div. 25, 4
(TISTM/ODN) OTS price $2.60

Stanford Research Inst., Menlo Park, Calif.
ENERGY ACCOMODATION IN EXOTHERMIC HETEROGENEOUS CATALYTIC REACTIONS,
by Bernard J. Wood, James S. Mills, and Henry Wise. Jan 63, 17p. incl. illus. table, 19 refs. (Proj. Squid technical rept. no. SRI-14-P)
(In cooperation with Virginia U., Charlottesville, Contract Nonr-362300, Proj. NR 098-038)
Unclassified report

DESCRIPTORS: *Nickel, *Platinum, *Tungsten, *Catalysis, Filaments, Hydrogen, Chemical reactions, Paramagnetic resonance, Electrons, Catalysts, Gases, Atoms, Energy, Theory, Surfaces.

The steady-state flux of mass and of energy at a solid catalytic surface due to heterogeneous recombination of hydrogen atoms were evaluated by a combination of EPR and calorimetric techniques. The catalytic surfaces employed were filaments of nickel, platinum, and tungsten. In general, only a fraction of the energy of atom recombination was found to be accommodated by the catalyst. The results suggest an upper limit to the energy flux which a solid can accept. This is interpreted to be governed by the lattice force constant of the catalyst which may be the rate-limiting factor in certain exothermic catalytic processes. (Author)

AD-295 505 Div. 25, 9, 15
(TISTP/JW) OTS price $1.60

Space Technology Labs., Inc., Redondo Beach, Calif.
A THEOREM ON ELECTROMAGNETIC BACKSCATTER,
by Richard J. Wagner and P. James Lynch, Dec 62, 9p. 6 refs. (Rept. no. 6110-7892-RU-000)
(Contract AF 04(694)1)
(BSD TDR 62-375) Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Axially symmetric flow, Equations, Magnetic fields, Vector analysis, Tensor analysis, Wave characteristics, Scattering, Theory.

A theorem is proved which gives sufficient conditions under which electromagnetic backscatter from an inhomogeneous object vanishes identically. (Author)

AD-295 570 Div. 25, 20
(TISTP/JW) OTS price $2.60

Electron Physics Lab., U. of Michigan, Ann Arbor.
AN ANALOG METHOD OF DETERMINING ELECTRODE SHAPES OF ELECTRON GUNS HAVING CURVED TRAJECTORIES,
by R. J. Lomax. Nov 62, 21p. incl. illus. table, 3 refs. (Technical rept. no. 54; Rept. no. 05000 2-T)
(Contract AF 33(657)8050, Proj. 4856)
Unclassified report

DESCRIPTORS: *Electron beams, *Electron guns, Analog systems, Partial differential equations, Linear systems, Control systems, Direction finding.

In the resistance analog method of determining Pierce electrode shapes to maintain a known electron beam, the solution of Laplace's equation is sought for values of the electric potential and normal field specified on the curved beam surface. The difficulty of satisfying two conditions simultaneously can be eased by dividing the problem into two parts. The potential distribution when there is the specified potential but zero normal field on the beam surface is determined, then when there is the specified normal field but zero potential. The linearity of Laplace's equation permits the two solutions to be superimposed to give the required equipotentials, two of which can be taken as electrodes. Experimental results obtained by this method are presented and compared with known analytical results. (Author)

AD-295 644 Div. 25
(TISTP/JW) OTS price $3.60

Naval Weapons Lab., Dahlgren, Va.
BOUNDARY LAYER ALONG A FLAT SURFACE NORMAL TO A VORTEX FLOW,
by Ernst W. Schwiderski and Hans Lugt.
20 Dec 62, 26p. incl. illus. 10 refs. (NWL rept. no. 1835)
Unclassified report

DESCRIPTORS: *Boundary layer, *Motion, Viscosity, Differential equations, Vortices, Numerical analysis, Fluid flow, Surfaces.

The axisymmetric vortex motion of a viscous fluid over a flat surface is investigated. Paradoxical results obtained by Moore and Goldshtik are resolved. Guided by a useful extension of Prandtl's boundary layer theory an appropriate similarity transformation is found which reduces the Navier-Stokes equations to three ordinary differential equations. The solution of the remaining boundary value problem reveals significant properties of vortex flows and explains several phenomena observed in hurricanes. A complete numerical result is displayed. (Author)

AD-295 656 Div. 25, 10, 27
(TISTM/ODN) OTS price $1.60

Space Systems Div., Air Force Systems Command, Inglewood, Calif.
MASS SPECTRAL ANALYSIS OF ROCKET ENGINE

COMBUSTION PRODUCTS CONTAINING BORON NITRIDE,
by A. V. Jensen, B. B. Goshgarian and N. E. Dane.
Dec 62, 10p. 3 refs. (Rept. no. SSD TDR 62-202)
Unclassified report

DESCRIPTORS: *Mass spectrometers, *Mass spectroscopy, *Rocket motors, *Nitrides, *Boron compounds, Hydrogen, Polymers, Radiofrequency, Combustion chambers, Nitrogen, Chemical analysis, Solids, Combustion.

Rocket engine firings using the propellant combination which forms boron nitride and other solids in the combustion chamber are being conducted. Analysis was required to ascertain the species present in the sample, e.g., hydrogen containing boron nitride polymers. This analysis was accomplished by the use of radio-frequency spark source solids mass spectrometric techniques. Data presented were obtained from a single engine combustion chamber sample. Other samples yielded similar results. (Author)

AD-295 660 Div. 25, 9
(TISTP/JW) OTS price $2.60

Space Technology Labs., Inc., Redondo Beach, Calif.
THE FLOW OF A DISSOCIATING GAS AROUND AND BEHIND A BLUNT HYPERSONIC BODY,
by Andrew G. Hammitt. 25 May 62, 19p. incl. illus. table, 2 refs. (Rept. no. 6130-6187-KU000)
(Contract AF 04(694)1)
(BSD TDR 62-107) Unclassified report

DESCRIPTORS: *Hypersonic flow, *Gases, Pressure, Deterioration, Reaction time, Relaxation time, Blunt bodies, Dissociation.

A study of dissociation reaction of a diatomic gas has been performed for the pressure history, a pressure rise and subsequent decay, common to hypersonic flow about a body. For this simplified case, several interesting phenomena which occur have been explored. A characteristic reaction time has been identified; the areas in which dissociation or recombination is the faster reaction have been specified; the areas in which equilibrium isentropic expansion leads to dissociation or recombination are found; the relative importance of the irreversibility associated with nonequilibrium relaxation has been defined. (Author)

AD-295 690 Div. 25, 15
(TISTP/JW) OTS price $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
NON-LINEAR EFFECTS IN A PLASMA,
by M. S. Macrakis. 8 Jan 63, 20p. incl. illus. 6 refs. (Rept. no. 25 G-13)
(Contract AF 19(628)500)
(AFESD TDR 63-13)
Unclassified report

DESCRIPTORS: *Plasma physics, *Hydrodynamics, Diffusion, Special functions, Attenuation, Non-linear systems, Equations.

The effects of the non-linearities in the dispersion and attenuation of longitudinal waves in a plasma are studied. Hydrodynamic equations are used to show that, to a first approximation, non-linearities affect the dispersion equation. The Boltzmann-Vlasov equation is used to indicate a general method for the study of the effects on non-linearities. Because of mathematical difficulties, a hybrid formulation is developed which is based on both the hydrodynamic and the Boltzmann-Vlasov equations and it is shown that, to a first approximation, non-linearities affect both the dispersion equation and the attenuation in a plasma. (Author)

AD-295 726 Div. 25, 26
(TISTE/OHD) OTS price $1.60

TYCO Labs., Inc., Waltham, Mass.
THE TRAVELLING SOLVENT METHOD OF CRYSTAL GROWTH.
Quarterly rept. no. 6, 16 Aug-15 Nov 62,
by L. B. Griffiths, N. A. Wright, and A. I. Mlavsky. 15 Dec 62, 14p. incl. illus.
(Contract AF 19(604)8803, Proj. 4608)
(AFCRL 62-971) Unclassified report

DESCRIPTORS: *Crystals, *Growth, *Intermetallic compounds, Silicon compounds, Chromium, Carbides, Surfaces, Oxidation, High temperature research, Vapor plating, Vacuum systems, Sandwich construction, Silicon, Temperature, Wetting agents, Platinum alloys, Single crystals, Solvent action.

Large crystals of alpha-SiC have been grown from solution in chromium by the traveling solvent method at an average temperature of ca. 1800 C. The major problem has been the proper wetting of the SiC surface by chromium; this problem has not been solved using an ultra-high vacuum heating treatment, followed by the evaporation of chromium onto the clean surfaces. Preliminary experiments using silicon and platinum as solvents have shown encouraging results. (Author)

AD-295 737 Div. 25, 4
(TISTP/JW) OTS price $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIVISION 8. SOLID STATE.
Quarterly progress rept., 1 Oct-31 Dec 62.
15 Jan 63, 5p.
(Contract AF 19(628)500)
(AFESD TDR 63-15) Unclassified report

DESCRIPTORS: *Solid state physics, Chemistry, Electrochemistry, Materials, Quantum mechanics, Scientific research.

AD-295 751 Div. 25
(TISTP/JW) OTS price $3.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
LINEARIZATION IN PROBLEMS OF FINITE PLASTIC FLOW,
by Manohar Singh. Jan 63, 33p. incl. illus. 10 refs. (Technical rept. no. 85; Rept. no. C11-85)
(Contract Nonr-56210, Proj. NR 064-406)
Unclassified report

DESCRIPTORS: *Fluid flow, elastic flow Surfaces, Stresses, Cylindrical bodies, Plasticity, Linear systems, Numerical analysis.

Various methods of linearizing yield condition and flow rule are discussed in connection with problems in finite plastic strains (drawing of tubes, nosing of shells). The numerical results presented in this paper show that, when carefully handled, some of these methods give excellent approximations to the predictions of von Mises theory, which will usually involve more elaborate analysis. (Author)

Division 25 - PHYSICS

AD-295 758 Div. 25
(TISTA/FRL) OTS price $8.10

Aerospace Corp., Los Angeles, Calif.
THE DYNAMIC STABILITY OF ELASTIC SYSTEMS. VOLUME I,
by V. V. Bolotin, tr. by V. I. Weingarten and others. 1 Nov 62, 72p. incl. illus. 80 refs. (Rept. no. TDR-169(3560-30)TR-2, vol. 1)
(Contract AF 04(695)169)
(SSD TDR 62-154, vol. 1)
Unclassified report

DESCRIPTORS: *Elasticity, Dynamics, Stability, Differential equations, Damping, Mathematical analysis, Theory.

AD-295 763 Div. 25
(TISTP/JW) OTS price $3.60

Cruft Lab., Harvard U., Cambridge, Mass.
NONLINEAR OPTICAL PROPERTIES OF SOLIDS: ENERGY CONSIDERATIONS,
by P. S. Pershan. 14 Nov 62, 33p. tables, 26 refs. (Technical rept. no. 393)
(Contract Nonr-186616, Proj. NR 372-016)
Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Optical systems, Harmonic oscillators, Nonlinear systems, Magnetic moments, Electrical fields, Time, Solids.

It is shown that the interaction between macroscopic, nondissipative media, and time-varying electromagnetic fields can be described by a time-averaged potential function. From this function it is possible to phenomenologically derive the tensors that describe any of the usual electro- and magneto-optic effects for electric and magnetic fields of any frequency. In addition, these same potential functions describe the various optical nonlinearities like harmonic generation in KDP, and harmonic generation by electric quadrupole and magnetic dipole nonlinearities. The symmetry relations first derived by Armstrong, Bloembergen, Ducuing, and Pershan for electric dipole nonlinearities follow directly from the methods presented here. In addition, one can derive analogous relations for electric quadrupole and magnetic dipole nonlinearities. These relations also demonstrate the reciprocal nature of the linear electro-optic effect and rectification of light. The Faraday effect and the production of a dc magnetization due to incident circularly polarized light are also reciprocal effects. (Author)

AD-295 787 Div. 25, 9
(TISTP/JW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE HYPERSONIC AREA RULE,
by M. D. Ladyzhenskiy. 3 Jan 63, 11p. incl. illus. 4 refs. (Trans. no. FTD-TT-62-1311 from Inzhernernyy Zhurnal, 1:1, pp. 159-163, 1961)
Unclassified report

DESCRIPTORS: *Hypersonics, *Shock waves, Translations, Boundary layer, USSR, Blunt bodies.

The hypersonic area rule has been formulated in a work and in a hypothesis that all the mass of a gas is concentrated in an infinitely thin layer contiguous to the shock wave. According to that rule, when thin non-axially-symmetrical blunt bodies with the same bluntness drag values and the same laws of transverse area change in the direction of the stream and are subjected to flow, the shock-wave surfaces, the laws of pressure change, and the forces of resistance acting on the body coincide. In this process the surfaces of the shock waves have axial symmetry. (Author)

AD-295 792 Div. 25
(TISTP/JW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A PHOTOSERVOSYSTEM,
by R. I. Polonnikov. 25 Jan 63, 5p. incl. illus. (Trans. no. FTD-TT-62-1528 from Soviet Patent No. 140226 (683412/26) 25 Oct 1960)
Unclassified report

DESCRIPTORS: *Optics, *Telescopes, USSR, Translations, Servomechanism, Instrumentation.

AD-295 804 Div. 25
(TISTM/EJH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PROPERTIES OF BLENDED BARIUM AND STRONTIUM FERRITES,
by Ye. S. Borovik and N. G. Usikova. 4 Jan 63, 10p. incl. illus. tables, 5 refs. (Trans. no. FTD-TT-62-1539 from Fizika Metallov i Metallovedenie, 13:3, pp. 470-474, 1962)
Unclassified report

DESCRIPTORS: *Ferromagnetic materials, *Ferrites, Barium compounds, Strontium compounds, Oxides, Iron compounds, USSR, Sintering, Temperature, Physical properties, High temperature research, Hardness, Density, Magnetic properties.

AD-295 812 Div. 25
(TISTM/ODN) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
STUDYING MAXIMUM LOAD FOR RIBBED CYLINDRICAL SHELLS SUBJECTED TO SIMULTANEOUS EFFECT OF AXIAL FORCES AND INTERNAL PRESSURE,
by I. Ya. Amiro. 4 Jan 63, 10p. incl. illus. tables, 5 refs. (Trans. no. FTD-TT-62-1625 from Ukrainian periodical, Prykladna Mekhanika, 7:5, pp. 496-502, 1961)
Unclassified report

DESCRIPTORS: *Structural shells, Loading, Pressure, Buckling, Reinforcing materials, Energy, Mathematical analysis, Deformation, USSR, Cylindrical bodies.

The axial force, which at a given internal pressure, leads to destruction of a ribbed, closed cylindrical shell, can be designated on the basis of various premises. Two ways of establishing the approximate value of maximum load are discussed. (Author)

AD-295 813 Div. 25, 4
(TISTM/ODN) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ANALYSIS OF EXPERIMENTAL THERMAL VALUES AND EQUATION OF STATE FOR HYDROGEN,
by V. A. Rabinovich. 11 Jan 63, 13p. incl. illus. tables, 19 refs. (Trans. no. FTD-TT-62-1569 from Inzhenerno-Fizicheskiy Zhurnal, 5:5, pp. 30-37, 1962)
Unclassified report

DESCRIPTORS: *Hydrogen, *Thermodynamics, *Gases, Pressure, Volume, Temperature, Dissociation, Equations of state, Specific heat, Energy, Data, USSR.

Detailed analysis is made of the pvT data of various experimenters. This is used to derive a grid of reference values for thermal quantities. An equation of state is set up for hydrogen and the feasibility of extrapolating it into the high-temperature region while allowing for the dissociation of hydrogen molecules is demonstrated. (Author)

AD-295 819 Div. 25, 8, 2
(TISTP/JW) OTS price $8.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
TRANSACTIONS OF THE ACADEMY OF SCIENCES OF THE USSR, INSTITUTE OF EARTHS' MAGNETISM, THE IONOSPHERE AND RADIO WAVE PROPAGATION (SELECTED ARTICLES).
16 Jan 63, 88p. incl. illus. tables, 16 refs.
(Trans. no. FTD-TT-62-1331 from Trudy, Akademiya Nauk SSSR, Institut Zemnogo Magnetizma, Ionosfery i Rasprostraneniya Radiovoln, No. 19(29) pp. 1-17, 18-30, 44-47, 96-112, 1961)
Unclassified report

DESCRIPTORS: *Ionospheric disturbances, Magnetic storms, Cosmic rays, Weather forecasting, USSR, Translations, Probability.

AD-295 820 Div. 25, 4
(TISTM/ODN) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EFFECT OF ULTRASOUND OF NITROPARAFFIN-CARBONYL CONDENSATION,
by L. M. Kozlov, V. I. Burmistrov, and T. M. Khannanov. 17 Dec 62, 6p. 7 refs. (Trans. no. FTD-TT-62-1261 from Trudy Kazanskogo Khimiko-Tekhnologicheskogo Instituta imeni S. M. Kirova, No. 26, pp. 63-66, 1959)
Unclassified report

DESCRIPTORS: *Ultrasonics, Nitro radicals, Methanes, Carbonyl radicals, Condensation reactions, Alcohols, Acetaldehydes, Acetones, Cyclohexanes, USSR, Organic compounds.

It has been shown that ultrasonics considerably accelerates nitroparaffin carbonyl condensation and simultaneously increases the yield of nitroalcohols. (Author)

AD-295 824 Div. 25
(TISTP/JW) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NEWS OF SCHOOLS OF HIGHER EDUCATION, PHYSICS (SELECTED ARTICLES).
10 Jan 62, 28p. incl. illus. tables, refs.
(Trans. no. FTD-TT-62-1474 from Izvestiya Vysshikh Uchebnykh Zavedeniy, Fizika, No. 1, pp. 25-31, 32-35, 48-51, 1962)
Unclassified report

DESCRIPTORS: *Dielectric properties, Mica, Gamma rays, Translations, USSR, Deterioration.

AD-295 831 Div. 25, 30
(TISTW/JEA) OTS price $2.50

Laboratory for Electronics, Inc., Boston, Mass.
RESEARCH IN FERROMAGNETICS.
Annual rept. no. 4, 1 Sep 61-31 Aug 62.
31 Aug 62, 118p. incl. illus. table, 8 refs.
(Rept. no. 570-A4)
(Contract Nonr-267600, Proj. NR 048-137)
Unclassified report

DESCRIPTORS: *Thin films, *Curved profiles, *Magnetic susceptibility, *Electron microscopy, *Sequential analysis, Coils, Statistical tests, Velocity, Time signals, Configuration, Glass seals, Magnetic fields, Magnetic moments, Switching circuits, Hysteresis, Electron beams, Electron microscopes, Ferromagnetic materials, Motion, Mathematical analysis, Energy, Magnetic properties, Thickness, Films, Processing.

The magnetic studies reported result from an investigation of the domain wall motion required in a class of devices represented by the single-film, multi-bit storage device. Chapter I is concerned with the velocity of a domain wall in a thin magnetic film. Chapter II is concerned with magnetization configurations at edges in thin films. Chapter III deals with the preparation and study of electron microscope specimens. Chapter IV describes a modification of the electron microscope to permit the application of controlled magnetic fields to specimens under study. Chapter V discusses the general problem of switching in thin magnetic films when the switching field is oblique to the film's easy direction. A theoretical switching model is proposed that consists of a combination of rotational and sequential switching processes. In terms of basic film and applied field parameters, the model gives the field magnitudes at which various segments of the switching process will occur. (Author)

AD-295 834 Div. 25, 14
(TISTM/ODN) OTS price $1.10

Battelle Memorial Inst., Columbus, Ohio.
AN INVESTIGATION OF THE EFFECTS OF VERY HIGH PRESSURE AND TEMPERATURE ON SEMICONDUCTING AND INSULATING MATERIALS.
Summary rept.,
by C. M. Schwartz and A. P. Young. 31 Dec 62, 8p. refs.
(Contract AF 49(638)441).
Unclassified report

DESCRIPTORS: *Semiconductors, *Insulating materials, High pressure research, High temperature research, Electrical properties, Transformations, Nickel compounds, Cobalt compounds, Copper compounds, Chemical impurities, Materials, Oxides.

AD-295 856 Div. 25
(TISTM/ODN) OTS price $4.60

David Taylor Model Basin, Washington, D. C.
RECENT ADVANCES IN THE MEASUREMENT OF STRUCTURAL IMPEDANCE,
by Fred Schloss. Jan 63, 40p. incl. illus. tables (Rept. no. 1584)
Unclassified report

DESCRIPTORS: *Impedance, *Structures, *Accelerometers, Piezoelectric transducers, Instrumentation, Acceleration, Phase measurement, Frequency, Acoustic detectors, Recording devices, Measurement, Sensitivity.

Two devices for measuring mechanical impedance have been developed, one for heavy structures capable of measuring a stiffness of 140 x 10 to the 6th power lb/in. over the frequency range of 5 to 4000 cps and the other for lighter structures capable of measuring a stiffness of 5 x 10 to the 6th power lb/in. over the frequency range of 20 to 8000 cps. Phase angles are measured in the presence of noncorrelated vibrational and electrical noise and distortion. Each device uses two piezoelectric ceramics to sense the applied force and the acceleration response of the structure. The mass associated with the coupling between the impedance transducer and the structure is cancelled electronically. Novel details of the design are presented, such as the elimination of magnetic pickup by the piezoelectric transducers and the reduction of mechanical crosstalk. Manual and automatic phase and impedance measuring systems having a high degree of accuracy are discussed. The report includes procedures for determining the acoustic sensitivity, transverse sensitivity, rocking sensitivity, and strain sensitivity of accelerometers and practical considerations for making mechanical impedance measurements. (Author)

AD-295 868 Div. 25, 20
(TISTP/JW) OTS price $10.50

Aerospace Information Div., Washington, D. C.
X-RAY AND OPTICAL SPECTRA ANNOTATED BIBLIOGRAPHY OF SOVIET LITERATURE (PRELIMINARY).
11 Jan 63, 127p. incl. tables (AID rept. no. B-63-10)
Unclassified report

DESCRIPTORS: *X rays, *Optics, Spectrographic analysis, USSR, Solar disturbances, Oscillation, Wave characteristics, Bibliography.

AD-295 871 Div. 25
(TISTP/JW) OTS price $3.60

Institute of Engineering Research, U. of Calif., Berkeley.
ON A NONLINEAR THEORY OF ELASTIC SHELLS,
by W. L. Wainwright. Jan 63, 32p. 6 refs. (Technical rept. no. 18; Series 131, Issue 18)
(Contract Nonr-22269, Proj. NR 064-436)
Unclassified report

DESCRIPTORS: *Elastic shells, *Nonlinear systems, Elasticity, Equations, Mechanical properties, Stresses, Deformation, Theory.

A nonlinear theory of elastic shells with small deformations whose material response is nonlinear is discussed. The developments are carried out under the Love-Kirchhoff hypothesis. General constitutive equations are derived in which the geometrical properties (due to deformation) and the material characteristics are separable. Through this separability, it is shown how to extract constitutive equations of predetermined types. Particular examples are followed by a discussion of the membrane theory. (Author)

AD-295 889 Div. 25, 15
(TISTP/JW) OTS price $5.60

Pennsylvania State U., University Park.
PROGRESSING WAVE ANALYSIS OF BLAST WAVES IN SPHERES,
by Norman Davids and Harry H. Calvit. 30 Nov 62, 54p. incl. illus. tables, 16 refs. (Technical rept. no. 1)
(Contract DA 36-034-ORD-3576)
Unclassified report

DESCRIPTORS: *Wave characteristics, *Blast, Motion, Solids, Propagation, Equations of state, Differential equations, Partial differential equations, Aluminum, Spheres, Shock waves, Cavitation.

A theory of crater formation by impact awaits better understanding of the process of shock-wave propagation in solids, especially waves with spherical symmetry. This paper studies theoretically and experimentally the non-steady motion of metallic spheres initiated by explosive blast in a spherical cavity. The method of progressing waves is applied to determine the radius versus time diagram of the propagation of the wave into the material and leads to values for cavity sizes. The assumptions are made that the material in the vicinity of the cavity possesses a polytropic equation of state, that entropy is constant for an element of material, and that the total energy is constant in time. The original partial differential equations of the problem are then reducible to a succession of ordinary differential equations. Using the Rankine-Hugonoit relations as initial conditions at the shock front, these equations have been integrated using a numerical program developed for a number of metals and the construction of r,t-diagrams carried out with values for particle velocities and pressure variation on the inner surface. The solutions of the differential equation of progressing waves have been studied by constructing a solution diagram, which is similar to a hodograph plane. An analysis was made of this plane and the role played by the singularities of the differential equation. (Author)

AD-295 892 Div. 25, 9
(TISTP/JW) OTS price $1.10

Michigan State U., East Lansing.
PARAMAGNETIC RELAXATION AT VERY LOW TEMPERATURES.
Final rept.
1963, 6p.
(Contract AF 49(638)613)
Unclassified report

DESCRIPTORS: *Paramagnetic resonance, *Low temperature research, Low frequency, Sound generators, Relaxation time, Magnetic fields.

Paramagnetic relaxation was examined in the following situations: (1) nuclear relaxation as a function of paramagnetic centers; (2) antiferromagnetic relaxation examined by a probe nucleus or antiferromagnetic center; (3) second sound generation by relaxation energy; (4) paramagnetic relaxation in color centers and centers produced by irradiation; and (5) paramagnetic relaxation at low fields and low frequencies. (Author)

AD-295 897 Div. 25, 9, 20
(TISTP/JW) OTS price $12.50

Cruft Lab., Harvard U., Cambridge, Mass.
PARAMAGNETIC RESONANCE LINES AT LOW TEMPERATURE,
by Ivar Svare and George M. Seidel. 5 Sep 62, 1v. incl. illus. tables, 107 refs. (Technical rept. no. 378)
(Contract Nonr-186616, Proj. NR-372-012)
Unclassified report

DESCRIPTORS: *Paramagnetic resonance, *Magnetic fields, Spin, Magnetism, Excitation, Spectrographic analysis, Sulfates, Salts, Crystals, Bibliography, Low temperature research, Electrons.

A number of paramagnetic resonance lineshapes have been analyzed and explained in terms of

spin-spin interaction. It is shown that this technique may be an important supplement to other methods of investigating interaction in paramagnetic salts. The advantages of the line moment method at low temperature are: (1) the exchange interaction can be found in sign and magnitude. Possible anisotropy of the exchange can be detected; (2) exchange interaction between unlike neighbors only can be measured; if the total exchange is known from other data, the exchange between like neighbors can be separated out; and (3) the method works best at rather weak interactions where specific heat and susceptibility experiments are difficult to perform with sufficient accuracy. The disadvantages of the method are: (1) a complex 3He cryostat is needed and it is difficult to mount the sample inside the cavity in good heat contact with the 3He reservoir; and (2) spherical samples are needed to avoid demagnetizing effects; however, magnetostatic modes are easily excited in spheres, and this may obscure the true lineshape. (Author)

AD-295 924 Div. 25
(TISTW/JEA) OTS price $2.60

Linde Co., Div. of Union Carbide Corp., East Chicago, Ind.
RUBY IMPROVEMENT FOR LASERS TASK I.
Quarterly progress rept. no. 2, 1 Aug-31 Oct 62,
by R. L. Hutcheson. 31 Oct 62, 18p. incl. illus. tables, 4 refs.
(Contract DA 36-039-sc-89089, Proj. 3A-99-21-001)
Unclassified report

DESCRIPTORS: *Crystal structure, *Metallic crystals, *Lasers, Schlieren photography, Temperature, Crystal ovens, Photographs, Crystallization, Ruby, Aluminum compounds, Tests.

The effects of thermal gradients, growth rate and annealing cycles on the growth of ruby for lasers are discussed. The growth information on three lots of ruby is presented. Evaluation data shows ruby grown with low relative growth rate to have superior crystal quality. (Author)

AD-295 950 Div. 25
(TISTM/ODN) OTS price $1.10

Illinois U., Urbana.
DISLOCATIONS IN SOLIDS.
Final rept.,
by Robb M. Thomson. 24 Dec 62, 6p.
(Contract AF 49(638)819)
Unclassified report

DESCRIPTORS: *Solids, *Crystals, Lithium compounds, Fluorides, Chemical impurities, Germanium, Theory, Diffusion.

AD-295 975 Div. 25, 20
(TISTP/JW) OTS price $1.10

University Coll., London (Gt. Brit.).
RESEARCH IN HIGH ENERGY PHYSICS AND RELATED TOPICS.
Final rept., Oct 61-Oct 62,
by J. Hamilton. 27 Nov 62, 4p.
(Grant AF EOAR 62-3)
Unclassified report

DESCRIPTORS: *Pions, Diffusion, Deterioration, Diffraction, Nucleons.

AD-295 991 Div. 25
(TISTW/JEA) OTS price $6.60

Douglas Aircraft Co., Inc., Santa Monica, Calif.
NONEQUILIBRIUM CENTERED EXPANSION OF A DISSOCIATED SUPERSONIC GAS FLOW,
by R. J. Shanahan, and G. R. Inger. 26 Oct 62, 52p. incl. illus. tables 15 refs. (Rept. no. SM-42492)
Unclassified report

DESCRIPTORS: *Gas flow, *Fluid mechanics, *Differential equations, *Supersonic flow, Enthalpy, Entropy, Supersonic diffusers, Thermodynamics, Conical bodies, Reaction kinetics, Viscosity, Density, Hypersonic flow, Gases, Partial differential equations, Conductivity, Integration, Vortices, Mach number, Real variables, Integrals, Propagation, Mechanics, Gas diffusion, Perturbation theory, Analysis, Low temperature research, Solid state physics, Dissociation.

A detailed analysis is presented of the nearly-frozen, nonequilibrium supersonic expansion of a dissociated diatomic gas around a sharp, two-dimensional corner, assuming an incoming stream in dissociation equilibrium. The analysis is based on a small perturbation technique in which small local departures from frozen flow near the corner are treated. The analysis is necessarily restricted in lateral extent but covers the entire angular range of the flow field and, therefore, brings out the nonlinear aspects of the nonequilibrium behavior. An exact analysis is presented (in similitude form for a diatomic gas) in which numerical procedures are required to effect the solution. However, in the exact solution, the expression for the atomic species mass fraction has been placed in closed form and, in conjunction with appropriate approximations, is used to determine the thermochemical field in an additional solution (applicable to hypersonic flow) which is approximate but entirely in closed form. Some numerical results for the first-order nonequilibrium flow field are presented. (Author)

26. PRODUCTION AND MANAGEMENT

AD-294 915 Div. 26, 15, 30
(TISTW/JEA) OTS price $2.60

California U., Los Angeles.
QUEUING WHEN JOBS REQUIRE SEVERAL SERVICES WHICH NEED NOT BE SEQUENCED,
by Richard V. Evans. 28 Sep 62, 21p. illus. 3 refs. (Working paper no. 17; Research rept. no. 79)
(Contract Nonr-23373, Proj. NR 047-003)
Unclassified report

DESCRIPTORS: *Functions, *Research program administration, *Statistical processes, *Job analysis, Production, Matrix algebra, Programming, Personnel, Economic mobilization, Mathematical logic, Logistics, Procurement, Probability, Processing, Statistical distributions.

Several queuing models are considered in which a job requires a number of different services. The services are performed in any sequence, possibly simultaneously, by a number of servers. Steady state probabilities are found for two service jobs processed by two server systems. In the first system, the two servers work on the same job if they are working. In the second system, the servers may work on different jobs. If server one is working on job k, server two may be working on job k-1, k, or k+1 but not on k-2

or k+2. In these systems, the servers are specialists. In the third system, the servers may perform either of the two required services. If one has bogged down, the other server does both parts of each job. (Author)

AD-294 948 Div. 26, 14, 8
(TISTM/RGR) OTS price $1.60

ITT Federal Labs., Nutley, N. J.
DEVELOPMENT OF MANUFACTURING PROCESS FOR HIGH PURITY ELECTRONIC CERAMICS.
Interim technical progress rept., 1 Sep-30 Nov 62 on Phase 2,
by J. H. Battle, A. J. Marino, Jr., and E. W. Currier. Dec 62, 13p. incl. tables, 2 refs.
(Contract AF 33(600)42473, Proj. 7-772)
(ASD TR 7-772, vol. 7)
Unclassified report

DESCRIPTORS: *Barium compounds, *Ceramic materials, *Titanates, Processing, Complex compounds, Piezoelectric materials, Strontium compounds, Manufacturing methods, Chemical analysis, X-ray diffraction analysis, Titanates, Production, Ferroelectric materials.

The purpose of this project is to develop new or improved manufacturing methods for large scale production of ferroelectric or piezoelectric ceramic materials such as titanates, zirconates, niobates, and tantalates. A major requirement is high purity (99.95%). The accomplishments during this fifth period of Phase II have been the operation of a pilot plant, the chemical and x-ray analyses of its product and the ceramic processing of the powders. The process for preparing $BaTiO_3$ was frozen, and ten consecutive runs were made. These were analyzed to determine the degree of reproducibility of the process. Results are included. (Author)

AD-294 949 Div. 26, 17
(TISTM/RGR) OTS price $2.75

Chance Vought Corp., Dallas, Tex.
SHEET METAL FORMING TECHNOLOGY.
Interim technical engineering rept. no. 4, 1 Oct-31 Dec 62,
by W. W. Wood, R. E. Goforth and others. Dec 62, 141p. incl. illus. tables.
(Contract AF 33(657)7314)
(ASD TR 7-871, vol. 4) Unclassified report

DESCRIPTORS: *Sheets, *Metals, *Manufacturing methods, Velocity, Impact shock, High pressure research, High temperature research, Explosive forming, Metal forming presses, Tensile properties, Test methods, Dies, Rubber, Aluminum alloys, Stainless steel, Tool steel, Alloys, Beryllium, Titanium, Heat resistant alloys.

Inherent limitations of sheet metal forming processes are investigated. Principal areas of investigation are concerned with the effect that primary process variables such as velocity, temperature, and pressure have on various classes of metals and alloys. Experimental work on tensile testing and forming under combined conditions of high velocity, high temperature, and high pressure is described. Results have been obtained on a projectile-impact test fixture, low-explosive closed system, high-explosive open system, electro-hydraulic-open system, and electromagnetic system and conventional presses. In addition, optimum ranges of velocity were obtained for each alloy and were related to the high energy rate forming systems. Generally, the ultra-high-speed systems utilizing shock waves for forming produce superior formability when compared with lower speed systems such as low explosive and conventional presses. Other materials, such as the titaniums and refractory metals, are not suitable for forming at high speeds except under suitable combined conditions with temperature. (Author)

AD-294 951 Div. 26, 17
(TISTM/ODN) OTS price $2.25

Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
TUNGSTEN FORGING DEVELOPMENT PROGRAM.
Interim technical progress rept. no. 7, 5 Sep-30 Nov 62,
by E. J. Breznyak and F. N. Lake. Dec 62, 90p. incl. illus. tables, 11 refs. (Rept. no. ER-5155)
(Contract AF 33(600)41629, Proj. 7-797)
(ASD TR 7-797, vol. 7)
Unclassified report

DESCRIPTORS: *Tungsten, *Tungsten alloys, *Forging, Extrusion, Non-destructive testing, Crystallization, Microstructure, Dies, Mechanical properties, Tensile properties, Chemical analysis, Hardness, High temperature research.

Large diameter centrifugally cast W-2%Mo billets have been reproducibly extruded to yield sound forging billet stock. The forging process previously developed for structural tungsten forgings has been successfully extended to thin section non-structural components in the form of a cup shape. Forging parameters have been defined. Evaluation of the W-2%Mo thin section forgings indicates process reproducibility. Ductile-brittle transition temperature and high temperature tensile properties are reported. (Author)

AD-294 973 Div. 26, 8
(TISTE/CAM) OTS price $4.60

Radio Corp. of America, Harrison, N. J.
PRODUCTION ENGINEERING MEASURE FOR TUBE TYPE 7587.
Quarterly progress rept. no. 2, 1 Sep-30 Nov 62,
by W. Ackermann. 30 Nov 62, 41p. incl. illus.
(Contract DA 36-039-sc-86732)
Unclassified report

DESCRIPTORS: *Electron tubes, *Manufacturing methods, *Industrial equipment, *Machines, Tetrodes, Triodes, Processing, Management engineering, Automatic, Production, Model tests, Design.

A detailed account is given of effort expended towards implementing the engineering production measure to produce Nuvistor type tubes. Effort was expended in the following phases: (1) the translation of the equipment concepts, conceived during the first quarter, into practical working prototypes; (2) the evaluation and proof testing of the prototypes on a laboratory basis; (3) the reduction of the development results into practical designs; and (4) the activation of actual equipment construction. (Author)

AD-295 004 Div. 26, 17, 7
(TISTM/RGR) OTS price $4.60

Linde Co., Div. of Union Carbide Corp., Cleveland, Ohio.
RESEARCH AND DEVELOPMENT WORK ON ELECTROLYTIC NIOBIUM AND NIOBIUM ALLOY CAPACITORS OF WET AND SOLID TYPES.
Quarterly progress rept. no. 2, 1 Oct-31 Dec 62,
by F. E. Cariou. Jan 63, 33p. illus.
(Contract NObsr-87478)
Unclassified report

DESCRIPTORS: *Niobium, *Niobium alloys, *Capacitors, Impurities, Tantalum alloys, Powder alloys, Carbon, Single crystals (Metallurgy), Powder metals, Anodes, Processing, Foils, Platinum alloys, Zirconium alloys, Electrolytes, Tantalum compounds, Niobium compounds, Oxides, Films, Manufacturing methods.

A status report is presented showing progress in the following areas: trace impurity analysis of Nb materials; preparation of Nb alloys with Ta, Pt, and Zr; optimum conditions for removal of C from Nb; optimum anodization conditions for Nb anodes; processing conditions for solid Nb plug capacitors; preparation of purified Nb powdered and foil; optimum electrolyte fill for wet plug capacitors; properties of Ta205 and Nb205 films.

AD-295 437 Div. 26
(TISTM/ODN) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CUTTING TOOLS, FIRE, WATER, POWDER,
by B. Zubkov. 9 Nov 62, 13p. (Trans. no. FTD-TT-62-1357 from Znaniye Sila, 36:11, pp. 11-14, 1961)
Unclassified report

DESCRIPTORS: *Cutting tools, Machining, Dies, Machine tools, Rockets, Powders, Electrochemistry, USSR, Electron guns, Metals.

AD-295 451 Div. 26, 17
(TISTM/ODN) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EFFECT OF CYCLIC HEAT TREATMENT ON THE DIMENSIONAL STABILITY OF METALS AND ALLOYS WHEN A LOAD IS CONTINUOUSLY APPLIED,
by A. A. Bochvar, G. Ya. Sergeev and others. 7 Dec 62, 13p. incl. illus. 7 refs. (Trans. no. FTD-TT-62-1271 from Issledovaniya po Zharoprochnym Splavam, AN SSSR, Inst. Metallurgii im. A. A. Baykov, 7, pp. 3-10, 1961, Moskva)
Unclassified report

DESCRIPTORS: *Metals, *Alloys, Stability, Aluminum, Uranium, Brass, Zinc, Deformation, Phase transitions, Elasticity, Copper alloys, Zinc alloys, Stresses, Creep, USSR, Heat treatment.

Slight tension to specimens of uranium, aluminum, zinc, and alpha and beta-brass during cyclic heat treatment (c.h.t.) produces considerable residual deformation, which substantially exceeds in value (sometimes by several times) the total deformation from creep and from c.h.t. without application of load. Cyclic heat treatment of transverse specimens of textured sheet uranium in the alpha-phase temperature region, and also of beta-brass without tension, causes contraction of the specimens, but with small external tension causes considerable elongation on their part in the direction in which the external force acts. Cyclic heat treatment of uranium with a continuously applied load and a transition through the point of phase transformation alpha to beta the residual plastic deformation increases in comparison with the deformation resulting from c.h.t. within the limits of the alpha-region. In alpha + beta brass the residual deformation resulting from tests for creep alone considerably exceeds deformation under the influence of c.h.t. with a continuously applied load. The dimensional change of the specimens is directed toward the action of the applied external force. (Author)

AD-295 626 Div. 26, 17, 14
(TISTM/SJR) OTS price $7.60

Armour Research Foundation, Chicago, Ill.
LINER FOR EXTRUSION BILLET CONTAINERS.
Interim technical documentary progress rept., 5 June-5 Dec 62 on Phase 1, Design and Construction of New Billet Containers,
by S. A. Spachner. 5 Dec 62, 71p. incl. illus. tables.
(Contract AF 33(657)8784)
(ASD TDR 7-945, vol. 2) Unclassified report

DESCRIPTORS: *Processing, *Manufacturing methods, *Extrusion, *Ceramic materials, *Ceramic coatings, Tensile properties, Elasticity, Deformation, Cylinder liners, Containers, Design.

Two shrink-fitted, compound sleeve assemblies have been designed to supply required support for use of solid ceramic, ceramic-coated metal, and elevated temperature metal extrusion liners, at stem pressures of 180,000 psi. Liner and sleeve machining and shrink-fitting data are supplied. The first assembly develops required support for ceramic liners and other materials which have high compressive strength and low tensile strength. The second assembly provides required support for materials which have modest elastic strain capability and/or strength in both tension and compression. A device has been designed for the rapid heating and accurate assembly of sleeves to be shrink-fitted. (Author)

AD-295 679 Div. 26, 7, 8
(TISTM/SJR) OTS price $9.10

Eastman Kodak Co., Rochester, N. Y.
A PROGRAM TO DEVELOP A SYSTEM FOR THE INSPECTION OF SOLDERED ELECTRICAL JOINTS.
Final rept., 4 Mar 61-30 June 62,
by W. L. Zinke and C. Tepper. 28 Dec 62, 108p. incl. illus. tables (Rept. no. EK/ARD ED-866)
(Contract DA 30-069-507-ORD-3252)
Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Soldered joints, *Electronic equipment, *Quality control, Test equipment, Test methods, Vibration, Safety, Hazards, Tensile properties, Ultraviolet radiation, Fluorescence, Printed circuits, Circuits, Electrical equipment.

This inspection system is a refinement of commonly used visual inspection for surface defects of solder joints. By making defects luminous under ultraviolet light, visual inspection becomes more reliable, less time consuming, and less dependent on operator skill and judgement. The system is useful for inspection of soldered joints in any electronic assembly, but particularly applicable to printed circuit construction. It is non-destructive, compatible with any manufacturing rate, and sensitive enough to detect quality trends before obviously defective material is produced. (Author)

AD-295 700 Div. 26, 30, 12
(TISTM/EJH) OTS price $8.60

General Electric Co., Cincinnati, Ohio.
DYNAMIC SHAFT SEALS IN SPACE.
Quarterly project status rept. no. 2 for period

ending 15 Oct 62.
15 Oct 62, 87p. incl. illus. tables, 17 refs.
(Contract AF 33(657)8459)
Unclassified report

DESCRIPTORS: *Seals, *Rotary seals, Spaceships, Liquid metals, Potassium, Lubricants, Rotating structures, Disks, Design, Hydrodynamics, Fluid flow, Fluids, Space environmental conditions, Water, Test methods, Test equipment, Rings, Shafts.

The main events of this reporting period are: (1) Completion of water testing with the rotating housing-stationary disk seal configuration to 20,000 rpm. (2) Analytical review of the rotating disk-squeeze seal configuration for use in the water test rig to 20,000 rpm. (3) Design and placement of manufacturing order for the rotating disk-squeeze seal configuration for 20,000 rpm water tests. (4) Analytical review of the screw seal configurations with attempts to optimize the seal for 20,000 rpm water tests. (5) Design, manufacture and preliminary checkout of 20,000 rpm screw seal test rig. (6) Initiation of 36,000 rpm liquid metal seal test rig design. Final selection of the test rig material and shaft sizing was made with the aid of computer programs for analyzing the vibration characteristics and internal temperature distributions. (7) Preliminary design was completed for the liquid metal seal test facility and orders were placed for the long lead time facility components. (Author)

AD-295 703 Div. 26, 17
(TISTM/SJR) OTS price $8.60

Northrop Corp., Hawthorne, Calif.
QUARTZ LAMP RADIANT HEAT BRAZING OF LARGE REFRACTORY METAL HONEYCOMB SANDWICH PANELS.
Interim engineering progress rept., 10 Oct 62-10 Jan 63,
by D. B. Hugill and B. Gaiennie. 10 Jan 63, 89p. incl. illus. tables, 12 refs. (Rept. no. IR-7-937a(II))
(Contract AF 33(657)8910, Proj. 7-937a)
Unclassified report

DESCRIPTORS: *Sandwich panels, *Honeycomb cores, Radiant heating panels, Tensile properties, Titanium alloys, Molybdenum alloys, Zirconium alloys, Soldering alloys, Manufacturing methods, Design, Processing, Re-entry vehicles, Refractory materials, Brazing.

AD-295 734 Div. 26, 14
(TISTM/ODN) OTS price $.75

Rock Island Arsenal Lab., Ill.
TRANSPARENT SKIN AND BLISTER PACKAGING,
by R. L. Murrens. 31 Oct 62, 27p. incl. illus. tables (Rept. no. 62-3600)
Unclassified report

DESCRIPTORS: *Packaging, *Plastics, Seals, Tests, Electronic equipment, Vacuum systems, Vinyl radicals, Acetates, Esters, Polymers, Ethylenes, Cellulose acetates, Laminates, Butyrates, Steel, Humidity, Materials, Low temperature research, Fracture (Mechanics), Manufacturing methods, Films.

Transparent skin and blister packages enclosing steel panels and various small items were fabricated by vacuum forming and electronic sealing equipment and submitted to various laboratory accelerated tests for evaluation. The results of these tests indicated that a polyester/polyethylene laminate as a skin packaging material would provide level A protection. Both vinyl and cellulose acetate butyrate have excellent clarity and qualities for fabrication with automatic vacuum forming and electronic sealing equipment. These materials have limited use. When formed into blisters and subjected to low temperature and high humidity tests, the blisters exhibited embrittlement, cracking, and swelling. (Author)

AD-295 738 Div. 26, 1
(TISTM/SJR) OTS price $1.10

Lodge and Shipley Co., Cincinnati, Ohio.
MAGNESIUM ALLOY AIRFRAME.
Monthly progress rept. no. 23, 1-31 Dec 62,
by J. A. Warnken and William H. Busch.
14 Jan 63, 4p. illus.
(Contract DA 33-008-ORD-2084, Proj. TN2-8106)
Unclassified report

DESCRIPTORS: *Airframes, *Magnesium alloys, *Manufacturing methods, *Machining, Templates, Deformation, Configuration, Design, Hydroforming, Processing, Metal forming presses, Conical bodies.

AD-295 752 Div. 26, 17, 4, 1
(TISTM/ODN) OTS price $12.50

Douglas Aircraft Co., Inc., Long Beach, Calif.
CHEMICAL COMPOUNDS FOR METAL SHAPING.
Interim technical progress rept., 1 July-31 Dec 62,
by J. L. Jamieson, E. G. Partridge and others.
Jan 63, 176p. incl. illus. tables, 5 refs.
(Contract AF 33(600)43027)
(ASD TR 7-648, vol. 3)
Unclassified report

DESCRIPTORS: *Chemical milling, *Metals, *Stainless steel, *Honeycomb cores, Gels, Solids, Chemicals, Solutions, Porous materials, Electric currents, Electrochemistry, Cellulose acetates, Carboxymethylcellulose, Resistance, Electrolytic cells, Electrodes, Polarization, Thickness, Reduction, Acids, Processing, Electrolytes.

Electrical current applied to the gel etchant increases the etch rate and reduces gaseous reaction products. Polarization by deposit of insoluble reaction products on the anodic workpiece limits the reaction. Electrochemical etching improves definition and finish on plate stock but the etch rate is still low. On honeycomb, the electrochemical etch rate is 10-25 times the rate of chemical action alone. Tolerance and finish are improved by etching in a dielectric liquid environment. Porous solids carrying liquid etchants proved unsatisfactory. (Author)

AD-295 765 Div. 26
(TISTM/EJH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AN ULTRASONIC METHOD OF PRODUCING CHIP BREAKERS,
by V. N. Verezub, A. E. Potapenko and Ye. S. Chistyakov. 3 Jan 63, 8p. incl. illus. (Trans. no. FTD-TT-62-1266 from Izvestiya VUZov, Machinstroyeniye, No. 8, pp. 115-119, 1960)
Unclassified report

DESCRIPTORS: *Cutting tools, *Ultrasonics, *Manufacturing methods, Ceramic materials, Alloys, Machining, Abrasives, Surface properties, USSR.

An ultrasonic method of preparing chip breakers on the forward face of ceramic or hard-alloy

blades of a cutting tool is described. By this means chip breakers can be obtained of any shape (recess, chamfer, hole) of high surface cleanness, and with complete lack of blade spoilage from burns, microcracks, or cavities. (Author)

AD-295 848 Div. 26, 17
(TISTM/RGR) OTS price $2.60

Armour Research Foundation, Chicago, Ill.
DEVELOPMENT OF 2400 F FORGING DIE SYSTEM.
Interim technical progress rept., 28 Sep-27 Dec 62,
by H. Nudelman, A. H. Murphy and others. Jan 63, 18p. incl. illus. table.
(Contract AF 33(600)42861)
(ASD TR 7-886, vol. 7) Unclassified report

DESCRIPTORS: *Extrusion, *Dies, *Forging, Heat-resistant alloys, Refractory materials, Processing, Coatings, Oxidation, Creep, Salts, Barium compounds, Chlorides, Titanium compounds, Borides, Tungsten alloys, Molybdenum alloys, Viscosity, Silicon compounds, Carbides, Design, High-temperature research.

27. PROPULSION SYSTEMS

AD-295 499 Div. 27, 26, 14
(TISTM/EJH) OTS price $1.60

Calorobic Materials, Inc., Pearl River, N. Y.
DEVELOPMENT AND UTILIZATION OF OPTIMUM TECHNIQUES FOR THE FABRICATION OF TITANIUM BORONITRIDE ROCKET NOZZLES.
Quarterly rept. no. 1, 1 July-30 Sep 62,
by R. Strickman and J. Donnellon. Oct 62, 23p. incl. illus. tables (Technical rept. no. TR 371-9/4)
(Contract DA 30-069-ORD-3747, Proj. 59332008)
Unclassified report

DESCRIPTORS: *Rocket motor nozzles, *Refractory materials, Boron compounds, Titanium compounds, Borides, Nitrides, Powder metallurgy, Dies, Manufacturing methods, Thermal conductivity, Hydraulic presses.

Work completed on the preparation and initial development techniques for the fabrication of titanium diforide - titanium nitride - boron nitride rocket nozzle inserts and other test specimens is summarized. Design of machinery, equipment and tooling required to produce the various parts was initiated. In the fabrication of test parts, the need for new machining techniques and non-destructive parts inspection before and after machining was evident. (Author)

AD-295 631 Div. 27, 26, 12
(TISTM/SJR) OTS price $5.60

Aerojet-General Corp., Downey, Calif.
EXPLOSIVE FORMING OF CLOSURES FOR LARGE SOLID PROPELLANT MOTOR CASES.
Quarterly progress rept. no. 3, 17 Oct 62-17 Jan 63,
by A. W. Hall and I. Lieberman. 28 Jan 63, 13p. illus. tables (Rept. no. 0665-01(03)QP)
(Contract AF 04(611)8395)
Unclassified report

DESCRIPTORS: *Rocket cases, *Manufacturing methods, *Dies, *Rocket closure cups, Ice, Tests, Handling, Materials, Procurement, Explosive forming, Solid rocket propellants.

Explosively formed 120-inch diameter heads with 37-inch and 48-inch deflection are described. Comparisons of results from free forming and ice die forming are made and the relative advantages of each are presented. Specific problem areas associated with material procurement and material handling because of the unique sizes involved are briefly described. (Author)

AD-295 670 Div. 27
(TISTA/GEC) OTS price $1.60

Space Systems Div., Air Force Systems Command, Inglewood, Calif.
DESIGN AND TESTING OF A PYROGEN IGNITER FOR A LO2-LH2ROCKET ENGINE,
by Harold W. Gale and Philip C. Moedt. Dec 62,
(Rept. no. SSD TDR 62-201)
Unclassified report

DESCRIPTORS: *Rocket igniters, Design, Tests, Liquefied gases, Oxygen, Hydrogen, Liquid rocket propellants, Pyrogens.

The development aand current status of a solid propellant pyrogen igniter used with the LO2-LH2 segmented engine are presented. The objective of this igniter project was to provide the liquid chamber with a long duration (four second), hot flame which would be capable of igniting LO2-LH2 under the most difficult propellant mixing conditions. Fourteen checkout igniter firings were made and over 60 integrated system tests were conducted. The results of these tests have shown that the igniter is extremely reliable, very durable, and safe to work with. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-295 081 Div. 28
(TISTB/DGH) OTS price $6.60

Yale U., New Haven, Conn.
INTERRELATIONS OF STRESS AND ANXIETY IN DETERMINING PROBLEM SOLVING PERFORMANCE,
by Clifford H. Block. Oct 62, 64p. incl. tables.
(Technical rept. no. 8)
(Contract Nonr-60920, Proj. NR 150-166)
Unclassified report

DESCRIPTORS: *Decision making, *Stress (Psychology), *Anxiety, Measurement, Tests, Simulation, Determination, Reasoning, Effectiveness.

Problem-solving performance under three conditions of stress, with anxiety as an individual-difference variable, was investigated. The first purpose of the study was empirical: the literature relating these variables to problem solving is inconclusive. The second purpose involved an assessment of the effects of discrimination between stresses on the basis of the extent to which they have ego-threatening properties. The evidence suggested, although not conclusively, that the problem solving differences related to

stress and to (Test Anxiety Questionnaire) were not a function of differences in anxiety arousal, at least as measured by the (Adjective Check List Measure). The results were, therefore, interpreted by assuming that both TAQ and aptitude are related to differences in the level of self-confidence, and that the latter mediated the facilitative stress effects that were observed. The discussion also emphasized, first, the importance of having measures of aroused anxiety when interpreting stress and predispositional-anxiety effects and, second, the possible insensitivity of problem solving to some debilitating anxiety effects. (Author)

AD-295 085 Div. 28, 1
(TISTA/GEC) OTS price $4.60

Douglas Aircraft Co., Inc., Long Beach, Calif.
AN INVESTIGATION OF THE EFFECTS OF PULSED LIGHTING UPON AIRCRAFT DISPLAYS RELATIVE TO THE PRESERVATION OF DARK ADAPTATION FOR NIGHT FLYING,
by L. R. Uyeda and B. H. Levedahl. 18 July 62, 38p. incl. illus. tables (Rept. no. LB 30977)
(Contract Nonr-107600)
Unclassified report

DESCRIPTORS: *Instrument panels, *Tracking, Light pulses, Dark adaptation, Aircraft, Night flight, Visual perception, Human engineering, Visual acuity, Brightness, Test methods, Tests, Display systems, Illumination.

The relationship of pulsed and continuous lighting upon a compensatory task, and its subsequent effect on scotopic detection performance was examined under two levels of illumination. Response latency of detecting Landolt rings as well as the number of detection errors incurred was an index of the time required to effectively regain dark adaptation. On the basis of the results obtained, it is concluded that dark adaptation may be preserved if the visual display to which an individual is attending is illuminated with pulsed lighting in the frequency range of 5 to 15 cps. In this condition, the experimental vehicular tracking performance appears unimpaired. (Author)

AD-295 104 Div. 28
(TISTB/DGH) OTS price $1.10

Maryland U., College Park.
CODING AND USE OF INFORMATION IN PROBLEM SOLVING.
Progress rept., 1 Feb 62-31 Jan 63,
by Murray Glanzer. 21 Jan 63, 5p. refs.
(Contract DA 49-007-md-1004)
Unclassified report

DESCRIPTORS: *Information theory, *Decision making, Learning, Memory, Reaction time, Measurement, Verbal behavior, Perception, Storage, Coding.

AD-295 166 Div. 28, 30
(TISTB/MS) OTS price $2.60

Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
STUDIES IN THE ORGANIZATION OF MAN-MACHINE SYSTEMS.
Dec 62, 19p. refs. (BBN rept. no. 970)
(Contract AF 49(638)355)
Unclassified report

DESCRIPTORS: *Human engineering, *Computers, Scientific research, Research program administration, Design, Man.

The main outcomes of the study of system organization were: (1) recognition of a close analogy between large-scale military man-machine systems and systems of computer programs; (2) recognition of the representational capabilities of computer programs; and (3) a set of ideas about how to exploit the analogy and the capabilities in study of systems and in substantive work on systems. (Author)

AD-295 170 Div. 28
(TISTB/MS) OTS price $1.10

Washington School of Psychiatry, D. C.
AN EXPERIMENTAL ANALYSIS OF BEHAVIOR DURING SLEEP.
Annual progress rept., 1 Feb 62-31 Jan 63,
by John T. Hammack. 31 Jan 63, 6p.
(Contract DA 49-193-md-2180)
Unclassified report

DESCRIPTORS: *Sleep, Conditioned reflex, Motor reactions, Auditory thresholds, Electroencephalography, Physiology, Measurement, Man, Behavior.

This report is the second in a series of studies concerned with the nature of sleep as a behavioral and physiological state. Operant conditioning techniques and continuous measurement were used to produce and control behavior in sleeping adults, and to permit recording of behavioral and physiological data in individual subjects over extended periods. (Author)

AD-295 487 Div. 28
(TISTB/DGH) OTS price $2.60

Harvard U. Medical School, Boston, Mass.
SOCIAL ISOLATION AND SOCIAL INTERACTION: A BEHAVIORAL AND PHYSIOLOGICAL COMPARISON,
by David Shapiro, P. Herbert Leiderman, and Mona E. Morningstar. Jan 63, 28p. incl. illus. tables, 18 refs. (Technical rept. no. 5)
(Contract Nonr-186643, Proj. NR 170-518)
Unclassified report

DESCRIPTORS: *Sociometrics, *Group dynamics, Behavior, Galvanic skin response, Physiology, Sensory deprivation, Reaction (Psychology), Confinement, Adjustment (Psychology).

Eighty-four women performed a simple task under conditions of social isolation and social interaction in a three-person group. Success and failure in the task were made equivalent in both conditions, and the order of the experience was balanced. Mean level and variability of behavioral initiation, galvanic skin potential, and heart rate were compared. Both level and variability of initiation were greater for individuals working alone than in groups. Basal level of galvanic skin potential was higher and heart rate tended to be lower under conditions of group interaction. The variability of these measures, as measured by the mean square successive difference, did not differ between the conditions. Levels of initiation and galvanic skin potential were consistent for individuals relative to one another when the group situation preceded the alone situation. Individual differences in heart rate level and galvanic skin potential variability were consistent regardless of temporal order of the isolation and interaction experience. (Author)

AD-295 488 Div. 28
(TISTB/DGH) OTS price $1.10

Harvard U. Medical School, Boston, Mass.
SOME FACTORS AFFECTING DISAGREEMENT IN A SMALL GROUP,

by David Shapiro and Mona E. Morningstar.
Jan 63, 9p. incl. table (Technical rept. no. 6)
(Contract Nonr-186643, Proj. NR 170-518)
Unclassified report

DESCRIPTORS: *Group dynamics, *Decision making, Stimulation, Population, Analysis of variance, Sociometrics, Effectiveness, Behavior.

A study was conducted to determine the effects of several stimulus and population variables on rate of disagreement under conditions in which groups receive non-contingent reinforcement; that is, success is random. The stimulus variables are complexity of task, ratio of successful to total outcomes, and time or experience in the task. More disagreement was expected the more complex the task requirements, the less successful the group in achieving decisions, and the less experience in the task. The population variables are sex, college or non-college experience, and science or non-science interests. More disagreement was expected in men than in women, in college than in non-college subjects, and in science than in non-science majors. (Author)

AD-295 583 Div. 28
(TISTB/MS) OTS price $2.60

Operational Applications Office, Air Force Electronic Systems Div., Bedford, Mass.
POST-DISCRIMINATION GRADIENTS AROUND STIMULI WITH DIFFERENTIAL RATES OF OCCURRENCE IN A DISCRETE RESPONSE TASK,
by Donald B. Cameron. Dec 62, 25p. incl. illus. tables, 9 refs.
(Proj. 9674)
(ESD TDR 62-352) Unclassified report

DESCRIPTORS: *Visual perception, *Learning, *Psychometrics, Reaction (Psychology), Conditioned reflexes, Training, Standards, Effectiveness, Test methods.

Generalization gradients in an identification-type task reflect the willingness to apply identifying labels to stimuli which deviate from what might be called the "ideal standard" of a class. After training subjects to discriminate between pairs of ideal standards varied in both discriminability and frequency of occurrence, it is shown that post-discrimination generalization gradients are characterized by a redistribution of identifying responses around the more frequent standard as a function of discriminability. (Author)

AD-295 627 Div. 28
(TISTB/CCH) OTS price $2.60

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
CONTROLLED ROTATION AND STABILIZATION FOR THE ORBITAL WORKER,
by Philip V. Kulwicki and Gerald Peoples.
Dec 62, 22p. incl. illus. 4 refs.
(AMRL Memo. no. P-21) Unclassified report

DESCRIPTORS: *Human engineering, *Space navigation, Rotation, Mathematical analysis, Gyro stabilizers, Gyroscopes, Control, Effectiveness, Stabilization, Aviation personnel.

A self-maneuvering unit for an orbital worker who must perform maintenance, supply, and inspection tasks on or between space vehicles is discussed. One essential component of such a unit is a continuously acting stabilization system. This provides the worker with a stable self-oriented reference frame by which he may judge position, velocity, and acceleration. This type of stabilization can best be provided by momentum wheels which rotate uniformly in the manner of a gyroscope. Since a rotating wheel tends to remain in its plane of rotation in the absence of external forces, the capability for stabilization is provided. Likewise, since a rotating wheel tends to change its plane of rotation with the application of force moments (torques), the capability for controlled rotation is provided. This report serves to develop the principles of controlled rotation and incorporate them in a feasible stabilization-rotation system. (Author)

AD-295 630 Div. 28
(TISTB/CCH) OTS price $3.60

Army Electronics Research and Development Lab., Fort Monmouth, N. J.
RAPID VIEWING AND IMMEDIATE VERBAL REPORT IN THE RECOGNITION OF OBJECTS IN NATURAL ENVIRONMENTS,
by D. L. Huebner. Aug 62, 38p. incl. illus. tables, 7 refs. (AELRDL Technical rept. no. 2309)
Unclassified report

DESCRIPTORS: *Visual perception, *Target recognition, Errors, Velocity, Vision, Information theory, Reaction time, Effectiveness, Visual acuity.

A pilot experiment was conducted to determine preliminary estimates of interpretation performance at high rates of speed. Various factors of relevance in assessing such performance are discussed, using experimental results to illustrate their application. Requirements for a more comprehensive and statistically reliable experiment are outlined, and suggested areas for further research are discussed. The small number of samples of imagery and subjects made results only suggestive with respect to application. Performance measurement is presented as a complex function of several factors, including conciseness, relevance, accuracy, and rate. These performance measures were applied to the experimental results for illustrative purposes only, and are not to be understood as implying higher reliability than is inherent in the statistically low reliability of the data. The tendency for redundancy of reports to increase with viewing/response time suggests that prior training of interpreters in rapid recognition and reporting would lead to improved performance. (Author)

AD-295 602 Div. 28, 15
(TISTB/MS) OTS price $1.60

Columbia U., New York.
THE USE OF FACTOR ANALYSIS IN THE STATISTICAL ANALYSIS OF MULTIPLE TIME SERIES,
by T. W. Anderson. Nov 62, 17p. 14 refs. (Rept. no. SAM TDR 62-134)
(Contract AF 41(609)1534)
Unclassified report

DESCRIPTORS: *Factor analysis, *Statistical analysis, *Series, *Psychometrics, Real variables, Psychology, Test methods, Measurement, Time.

The function of factor analysis in time series analysis is discussed. The relationships between the models in the two approaches are observed, with distinction being drawn between exogenous and endogenous variables. Various approaches are suggested for analyzing multiple time series by factor analysis. (Author)

Division 29 - QUARTERMASTER EQUIPMENT AND SUPPLIES
Division 30 - RESEARCH AND RESEARCH EQUIPMENT

AD-295 697 Div. 28
(TISTB/DGH) OTS price $2.60

Bell Helicopter Co., Fort Worth, Tex.
EFFECT OF STIMULUS AMBIGUITY IN THE DISPLAY OF ATTITUDE INFORMATION,
by Claude B. Elam and John H. Emery. Sep 62, 16p. incl. tables, 5 refs. (Rept. no. D228-421-013)
(Contract Nonr-167000)
Unclassified report

DESCRIPTORS: *Visual perception, *Display systems, *Tracking, Airplane panels, Reaction (Psychology), Effectiveness, Terrain, Human engineering, Test methods, Transparent panels, Behavior.

A study was made to determine whether the presence of a grid line display superimposed over the terrain acts to degrade performance. Subjects were required to track in two dimensions (roll and pitch) to a grid alone, to a picture of the real world alone, and to the grid superimposed over the real world picture. No evidence was obtained that the presence of the grid would interfere with VFR. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-294 993 Div. 29
(TISTB/DGH) OTS price $12.00

Dunlap and Associates, Inc., Stamford, Conn.
A SURVEY OF THE EFFECTS OF LOAD-CARRYING AND EQUIPMENT DESIGN UPON TASKS PERFORMED BY THE COMBAT INFANTRYMAN,
by Morris Kolnicker and Martin A. Tolcott.
15 Nov 62, 1v. incl. illus. refs.
(Contract DA 44-188-ARO-5) Unclassified report

DESCRIPTORS: *Handbooks, *Human engineering, *Military equipment, *Bibliography, Cargo, Military personnel, Design, Stress (Physiology), Stress (Psychology), Fatigue (Physiology), Combat, Handling.

A survey was conducted to collect, organize, and summarize information about the effects of equipment design and load-carrying upon the performance of the infantry foot-soldier, and to identify gaps in this field of knowledge and suggest fruitful areas for future research. The scope of the study was limited to design of hand-held equipment, design of man-portable crew-served equipment, and design of loads, load-carrying devices and techniques. Primary interest was in the effects of these factors upon combat performance, but measures of physiological activity have been covered to a limited extent. Information sources included reports of laboratory research, field test and evaluation reports, training studies, Army staff studies and conference reports, opinions of combat officers and field personnel, reported observations of other cultural groups, and miscellaneous published articles. The most important general conclusion of the study is that available data relating infantry equipment design to soldier performance is inadequate to provide a solid basis for developing a design guide for man-carried equipment. Available data are summarized in Handbook form in Appendix B, according to type of equipment, but substantial supplementation, based on controlled studies of performance as a function of design, is considered a major requirement. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-294 921 Div. 30
(TISTB/DGH) OTS price $12.00

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
IMPROVEMENT OF THE IBM 1620 SPS PROCESSOR.
Master's thesis,
by Leland G. Fay. 12 Dec 62, 157p. incl. illus. tables, 18 refs. (Rept. no. GE/EE/62-5)
Unclassified report

DESCRIPTORS: *Computers, *Programming, *Coding, *Data processing systems, Processing, Digital computers, Configuration, Information retrieval, Operations research, Errors, Theses, Operation, Language, Theory.

The IBM 1620 SPS Processor Program is examined to determine the possibility of shortening the program and of increasing the capability of the processor. SPS programming and coding techniques used to accomplish these ends are described and illustrated. Program checkout procedures are explained and the modified processor is redesignated the AFIT Version of the 1620 SPS Processor. Operating instructions and a listing of the program are included. (Author)

AD-294 957 Div. 30
(TISTB/DGH) OTS price $9.60

Stanford Research Inst., Menlo Park, Calif.
DESIGN AND INSTRUMENTATION OF ERROR-CORRECTING CODES.
Final rept.,
by Bernard Elspas. Oct 62, 126p. incl. illus. tables, 26 refs.
(Contract AF 30(602)2327)
(RADC TDR 62-511) Unclassified report

DESCRIPTORS: *Computer logic, *Coding, *Instrumentation, Communications theory, Transmission, Reliability, Computers, Circuits, Distribution theory, Polynomials, Probability, Statistical analysis, Programming, Errors.

Properties of cyclic codes and codes related to cyclic codes, particularly with respect to the correction of single and multiple bursts of errors are discussed. Tables of these codes are included. Trading relations are developed that relate the number of bursts simultaneously correctible with a multiple-burst-correcting code to the length of these bursts. A bound is derived on the minimum number of check digits required for multiple-burst-correcting codes. Two new dma/ses of codes, both of them derived from cyclic codes, are applied in a novel way to problems of multidimensional error checking and of error location. Error-location codes are basically codes for error detection that also locate to within a sub-block of the received message where corrupted digits fall. These codes appear to be useful in connection with feedback communication systems. There is also some discussion of reliability questions for terminal equipment, a description of a versatile encoding and decoding device for cyclic codes (MAVERIC), and a discussion of quasi-cyclic, pseudo-cyclic and shortened cyclic codes (in which it is shown that these concepts are essentially equivalent). (Author)

AD-294 964 Div. 30
(TISTM/EJH) OTS price $3.60

Standard Cabinet Co., Inc., Carlstadt, N. J.
SALT IMMERSION CHAMBER.
Final rept.
1962, 26p. illus. (Serial no. 1324)
(Contract DA 30-069-504-ORD-3015)
Unclassified report

DESCRIPTORS: *Corrosion research, *Laboratory equipment, *Corrosion, Salts, Corrosive liquids, Solutions, Test methods, Containers, Materials, Plastics, Operation, Tanks, Coatings, Small arms ammunition, Test equipment.

The design, construction and operation of a prototype tester in which certain conditions of solution strength, temperature and flow can be accurately reproduced is reported. Corrosion tests with this apparatus have given more conclusive and consistent results than those obtained from standard salt spray tests.

AD-295 006 Div. 30
(TISTB/DGH) OTS price $3.60

System Development Corp., Santa Monica, Calif.
1604 JOVIAL COMPILER. VOLUME V. DESCRIPTION OF SYSTEM-DEPENDENT PROCEDURES.
1 Sep 62, 32p. incl. table (Technical memo. no. TM-WD-555/304/00, vol. 5)
(Contract DA 49-146-xz-070)
Unclassified report

DESCRIPTORS: *Programming, Configuration, Theory, Coding, Digital computers, Machine translation.

The areas of the 1604 Jovial compiler described in this document are isolated because of their unique machine (configuration) and system dependence. These areas undergo the most drastic changes when the compiler is transferred from the DASA program production system to any other system. The first chapter describes the routines that provide compool sensitivity. These routines expect the compool to be in a specific format. Furthermore, some of the rules that govern these routines (e.g., all compool tables are considered rigid length) are germane only to the production of programs for the DASA system. The second chapter describes the routines that process direct code. These routines reflect the particular assembler (modified CODAP phi) and the preprocessor that are used to produce programs for the DASA system. The third chapter describes the routines that process input and output statements. These routines provide input/output capability on the DASA machine configuration and are therefore machine configuration-dependent. These descriptions are designed to aid the programmer who is responsible for maintaining the compiler. They should be used only in conjunction with a listing of the related Jovial statements and with the documents that describe the phase (translator or generator) of the compiler in which these routines are housed. (Author)

AD-295 097 Div. 30
(TISTW/RD) OTS price $6.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
LOGIC DESIGN FOR TRISTABLE DEVICES.
Master's thesis,
by Joseph A. Krupinski. Dec 62, 59p. incl. illus. tables, 33 refs. (Rept. no. GE/EE/62-13)
Unclassified report

DESCRIPTORS: *Data processing systems, *Computers, *Digital computers, Analog-to-digital converters, Molectronics, Computer logic, Substitutes.

The development of a semiconductor device which exhibits three stable states of operation has prompted this thesis on ternary logic and its applications. A characteristic curve for the tristable device, called a TRINARY, is hypothesised and an equation determined which approximates the expected curve. The merits of the ternary system over binary are enumerated. The mathematics of a ternary number system is discussed and a method of converting between radix 3 and other number systems is presented. Some basic circuits of a ternary computer are presented and examples are given of a number of ternary circuits developed by others. (Author)

AD-295 098 Div. 30, 25
(TISTP/JW) OTS price $8.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
A COMPUTER MODEL FOR THE DETERMINATION OF FOUR-LEVEL LASER EFFICIENCY.
Master's thesis,
by Tom Gordon Purnhagen. Dec 62, 89p. incl. illus. tables, 4 refs. (Rept. no. GE/EE/62-18)
Unclassified report

DESCRIPTORS: *Lasers, *Computers, Theses, Ruby, Oscillation, Density, Measurement, Model tests.

Four-level Laser efficiency is maximized by a mathematical model which is developed by identifying the loss mechanisms which operate in the four-level Laser system, defining the system efficiency as the product of six sub-efficiencies, one associated with each loss mechanism, and deriving equations for the sub-efficiencies in terms of physically measurable parameters of the Laser system. The model is limited in its present form to the representation of pulsed four-level Lasers employing helical or annular lamp pumping, but could be easily extended to cover other pumping geometries and continuous operation. Based on the mathematical model, a program is written for the IBM 1620 digital computer which calculates the efficiency of a pulsed four-level Laser oscillator or the maximum efficiency and maximum gain of a pulsed four-level Laser amplifier. The program is written in a modification of IBM FORTRAN. On the basis of the model and the experience gained in its development and testing, it can be concluded that the efficiency of pulsed four-level Lasers will tend to increase as length, radius, doping density, and pumping energy are increased, and decrease as end reflectivities and pumping pulse time constant are increased, within the limits imposed by the assumptions and approximations used in the development of the model. (Author)

AD-295 146 Div. 30
(TISTP/FR) OTS price $4.60

RAND Corp., Santa Monica, Calif.
A PROGRAMMING SYSTEM FOR GENERAL NEURAL NETS.
by J. W. Smith. Jan 63, 41p. incl. tables, 7 refs. (Memo. no. RM-3416-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Nerves, Digital computers, Programming, Simulation.

A computer programming system for investigating general neural net activity is described. The system, called NET1, allows investigators to

construct nets, maintain files of nets, and compose--and execute--pre-planned programs of experimentation on nets. Such experimental programs may effect repeated simulations of a single net or collection of nets with inter-simulation variation of net components, parameters, and stimuli; and may interrogate, test, and vary such elements within an individual simulation. NET1 operates within the RAND version of the SHARE Operating System (SOS) for the IBM 7090. Net capacity and ratio of computing time to physiological time are discussed for that machine. (Author)

AD-295 150 Div. 30
(TISTA/FRL) OTS price $2.60

Naval Ordnance Test Station, China Lake, Calif.
NOTS SUPERSONIC TRACKS.
July 58, rev. Sep 62, 25p. incl. illus. table.
(Rev. no. 1 to rept. no. NOTS 1938, AD-200 540)
Unclassified report

DESCRIPTORS: *Tracks (Aerodynamics), Rocket propelled sleds, Design, Rocket motors, Liquid rocket propellants, Solid rocket propellants, Water brakes, Jatos, Friction brakes, Air brake flaps, High speed photography, Instrumentation, Aerodynamics, Programming, Supersonics.

The NOTS supersonic track complex is described. The complete track testing facility, consisting of three separate tracks, offers a wide variety of sled structures and propulsion techniques in addition to a broad range of sledborne and close-in photographic and electronic instrumentation. With its access to other station services, the facility is capable of performing complete track test programs from carriage design through static and dynamic tests, acquisition and assessment of data. The three tracks are equipped to handle a great many different types of tests requiring simulated flight conditions, and to furnish data in the areas of aerodynamics, vibration, acceleration, velocity, pressure, and temperature. (Author)

AD-295 171 Div. 30
(TISTB/DGH) OTS price $7.60

Melpar Inc., Falls Church, Va.
INVESTIGATION OF SPEECH PROCESSING STUDIES. VOICE DATA PROCESSING SYSTEM,
by D. M. Early, H. A. Straight, and O. C. King.
Oct 62, 1v. incl. illus. tables, 2 refs.
(Scientific rept. no. 1)
(Contract AF 19(628)214, Proj. 4610)
(AFCRL 62-911) Unclassified report

DESCRIPTORS: *Data processing systems, *Voice communication systems, Operation, Reliability, Temperature control, Computer logic, Programming, Coding, Data, Tables, Speech, Digital computers.

Results of speech processing studies covering the period from September 1961 to September 1962 are presented. This investigation has been responsible for the continued updating of the capability and flexibility of the Voice Data Processing System in an attempt to maintain optimum compatibility between the processor and the research effort for which it was intended. (The system was designed and developed to support research on digital voice communication and evaluation of a speech bandwidth compression technique.) Changes such as automatic consolidation of number of occurrences and cumulative amplitude inputs from rank ordered tapes, use of the approximation logic for 1 and 2, as well as 3-bit spectrum pattern coding, and separation of rank ordered data into tables of voiced and unvoiced patterns have been successfully incorporated in the processor. The results of a study to determine the optimum operating environment for the equipment complex are presented. Appendices include a Definition of Terms, the System Operating Instructions, and the results of a study of the Evaluation of Reliability with Respect to Thermal Environment for the Voice Data Processing System. (Author)

AD-295 179 Div. 30, 8
(TISTE/CAM) OTS price $12.50

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
REALIZATION OF A DIGITAL COMPUTER LABORATORY CAPABILITY,
Master's thesis,
by George W. McKemie. Dec 62, 1v. incl. illus. tables, 3 refs. (Rept. no. GE/EE/62-14)
Unclassified report

DESCRIPTORS: *Digital computers, Laboratory equipment, Electronic equipment, Programming, Pulse generators, Switching circuits, Trigger circuits, Electronic circuits, Computer logic, Coding, Mathematical logic, Algebras, Costs, Analysis, Model tests, Theory, Laboratories.

This thesis is a result of an analysis of contemporary commercial equipment that can be used to realize a digital computer laboratory capability and a result of an attempt to compile experiments that can demonstrate computer theory on the selected equipment. The requirements were established, and the equipment was selected that satisfied these requirements. Experiments were written demonstrating the essentials of basic computer logic. The thesis ends with the recommendation to obtain the capability described within. (Author)

AD-295 405 Div. 30
(TISTP/JEA) OTS price $8.10

RCA Industrial Electronic Products, Camden, N. J.
PROJECT LIGHTNING.
Interim research rept. no. 14A, 1 Mar-31 May 62 on High-Speed Data Processor System Research.
31 May 62, 81p. incl. illus. tables.
(Contract NObsr-77523)
Unclassified report

DESCRIPTORS: *Data processing systems, *Data transmission systems, *Memory devices, Control systems, Personnel, Time delay relays, Power supplies, Switching circuits, Configuration, Cooling, Timing circuits, Design, Reliability.

The goal of this project is the construction and operation of the combined Logic-Memory Subsystem. Both the Logic and Memory Subsystems have been built and are operating separately. Upon completion of the Logic Subsystem, fabrication effort was concentrated on the memory peripheral equipment. As a result, the memory and its associated equipment is at an earlier stage of checkout and debugging. Effort is being concentrated in this area in order to insure a smooth transition into the logic-memory combination phase. Tunneling devices and components required for the Memory and Logic Subsystems were delivered, together with a small quantity of spare units. Complete debugging of the entire Logic Subsystem has been complete for about a month and this setup is being run to provide reliability data. The subsystem was designed using worst-case analysis, and as such, its calculated repetition rate for

the full cycle of logical performance was approximately 140 nanoseconds. The 32-word, 5-bit memory stack was completed along with all of the peripheral equipment. A total of 160 bits of this stack have held information without errors for periods up to 3 hours. Due to continual debugging, the equipment reliability is constantly improving with the major causes of intermittance being those associated with mechanical rather than electrical sources. All words have been selected at a 33-megacycle rate operating continuously. (Author)

AD-295 416 Div. 30
(TISTW/JEA) OTS price $7.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
A RELAY DEVICE TO DEMONSTRATE RESIDUE-TO-DECIMAL NUMBER CONVERSION.
Master's thesis,
by Arthur James Altenburg. Dec 62, 34p. incl. illus. tables, 5 refs. (Rept. no. GE/EE/62-1)
Unclassified report

DESCRIPTORS: *Digital systems, *Digital computers, *Machine translation, *Electric relays, Range, Analysis, Analog-to-digital converters, Switches, Relay transmitters, Wiring diagrams, Switching circuits, Capacitors, Number theory, Machine translation, Computer logic, Relays, Data processing systems.

The residue-to-decimal conversion problem can be restated in terms of capacity, algebraic sign determination, and machine-to-human language translation. The capacity factor can be subordinated by a shift of responsibility from the device to its operator. Solutions to the remaining factors, based on the above notions of residue number, require that variations in assigned ranges of positive and negative numbers be limited to increments of the limiting modulus, the smallest modulus of the system. Problem solution logic, stated in terms of switching functions for the 3-4-5 residue number system, is duplicated by relay circuits to demonstrate application of the principles developed. (Author)

AD-295 450 Div. 30
(TISTW/JEA) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A SPIRAL-BAND HEAT EXCHANGER,
by N. V. Zhutautas. 9 Jan 63, 4p. incl. illus. (Trans. no. FTD-TT-62-292 from Soviet Patent No. 138259 (668191/28) 27 May 60)
Unclassified report

DESCRIPTORS: *Heat exchangers, Temperature, USSR, Heating elements, Metals, Helixes, Heat transfer, Construction.

In contrast to the known spiral-band heat exchangers, each section of the proposed one represents a system of channels arranged in spiral loops in which one of the streams of heat-exchanging media moves from the center of the channel to the periphery with a consequent change in the direction of its travel to a reverse one. This construction on the part of the heat exchanger improves the temperature regime in the axial channels of the section and permits a decrease in its weight and dimensions. (Author)

AD-295 501 Div. 30
(TISTP/JW) OTS price $18.50

System Development Corp., Santa Monica, Calif.
JOVIAL GENERATOR DESCRIPTION.
Technical memo. on Phase 1 and Phase 2,
by Virginia L. Cohen and Millard H. Perstein.
10 July 62, 293p. incl. illus. (Technical memo. TM-555/020/00)
Unclassified report

DESCRIPTORS: *Computers, *Programming, Language, Data processing systems, Design, Generators, Coding.

AD-295 507 Div. 30
(TISTA/GEC) OTS price $4.60

Tennessee U., Knoxville.
LOW-DENSITY HYPERVELOCITY WIND TUNNEL DIFFUSER PERFORMANCE,
by M. W. Milligan and J. F. Bailey. Jan 63, 42p. incl. illus. 90 refs.
(Contract AF 40(600)922, Proj. 8952)
(AEDC TDR 63-30) Unclassified report

DESCRIPTORS: *Hypersonic wind tunnels, Exhaust diffusers, Boundary layer, Super aerodynamics, Effectiveness, Hypersonic diffusers.

A complete literature survey was made in order to establish the current state of wind tunnel diffuser technology. Special attention was given to low-density hypervelocity applications. Such important flow parameters as geometry, boundary layer flow, real gas effects and rarefied gas effects are discussed. A series of experimental tests is recommended which would yield results applicable to predicting diffuser performance in the low-density hypervelocity range. (Author)

AD-295 571 Div. 30, 8, 6
(TISTP/JW) OTS price $8.10

Litton Systems, Inc., Waltham, Mass.
INVESTIGATION OF AUTOMATION OF SPEECH PROCESSING FOR VOICE COMMUNICATION.
Final rept., 15 July 61-14 Oct 62,
by George S. Sebestyen and David Van Meter.
14 Oct 62, 79p. incl. illus. tables, 6 refs.
(Contract AF 19(604)8828, Proj. 4610)
(AFCRL 62-946) Unclassified report

DESCRIPTORS: *Speech transmission, *Data transmission systems, *Voice communication systems, Analysis of variance, Library science, Communication systems, Compressors, Automatic, Design.

Analytic and experimental procedures applicable to improving the performance of a type of speech compression system are discussed. The system operates on the principle that the number of linguistically distinguishable varieties of instantaneous spectrum patterns in speech is much smaller than the total number used during any utterance. Considerable compression can be achieved by replacing original speech patterns by reference patterns selected from a relatively small library, and transmitting correspondingly short index numbers or descriptors identifying the reference patterns so used. The main problem dealt with in the present study concerns the choice of patterns to be used in the reference library. The minimum number of references needed and their exact specification depend on characteristics of human speech that can be determined only by experiment. Brief attention is also given to the speech segmentation problem and to encoding techniques. (Author)

Division 30 - RESEARCH AND RESEARCH EQUIPMENT

AD-295 589 Div. 30
(TISTB/DGH) OTS price $1.00

Airborne Instruments Lab., Inc., Deer Park, N. Y.
STUDY AND DEVELOPMENT OF A SELECTIVE MONITORING SYSTEM.
Final rept., June 61-July 62 on Biophysics of Flight,
by George W. Morton and Allen I. Ligorner.
Dec 62, 25p. incl. illus. table, 2 refs.
(Contract AF 33(616)8370, Proj. 7222)
(AMRL TDR 62-144) Unclassified report

DESCRIPTORS: *Monitors, *Space flight, Transducers, Data processing systems, Spaceships, Selection.

To reduce the load on data transmitting and processing equipment--and thereby reduce the size and power requirements of such equipment in space vehicles--methods of selecting only the significant portions of data from transducers were investigated, and a six-channel laboratory model of a selective monitoring system was built and tested. Two principles of data selection were studied: (1) selection based on departure of a process variable from the steady state, and (2) excursion of a process variable beyond predetermined limits. Selection data while in the analog state--as taken directly from the transducers--and selection data after conversion to digital code were studied. The laboratory model demonstrates selective monitoring of analog data after conversion to digital code and uses as a selection criterion either departure from the steady state or excursion beyond limits. A program for applying the knowledge gained by the study and the principles demonstrated by the model to space-vehicle equipment is described. (Author)

AD-295 651 Div. 30
(TISTB/DGH) OTS price $11.00

RAND Corp., Santa Monica, Calif.
PRELIMINARY CODES AND RULES FOR THE AUTOMATIC PARSING OF ENGLISH,
by Jane J. Robinson. Dec 62, 140p. incl. illus. tables (Memo. no. RM-3339-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Language, *Machine translation, *Information retrieval, Theory, Design, Programming, Simulation, Analysis, Coding, Automatic.

A set of grammar codes and rules for analyzing, or parsing, English sentences automatically on a digital computer is presented. The introduction briefly discusses the nature of parsing and the general model of English structure on which this approach is based, and the codes and rules are discussed in detail. Although the computer program is not explained at length, the logic underlying it is illustrated in the discussion of the rules. A complete list of the rules written so far and a sample output of parsed sentences are appended. The linguist and the programmer will find the presentation sufficiently detailed so that they can add to, refine, or modify the codes and rules, and design programs for applying them to text. (Author)

AD-295 673 Div. 30
(TISTE/CRJ) OTS price $2.60

Engineering Development Lab., Naval Air Development Center, Johnsville, Pa.
DIGITAL TRANSDUCER RESEARCH PROGRAM, 5935-M.
Final rept.,
by Charles L. Bossard. 12 Dec 62, 17p. incl. illus. tables, 1 ref. (Rept. no. NADC-ED-L6291)
(WEPTASK NO. R360FR102/2021/R01101001)
Unclassified report

DESCRIPTORS: *Transducers, Coding, Theory, Calibration, Vibration, Temperature, Humidity, Shock resistance, Magnetic effects, Digital systems.

A theoretical analysis of the digital magnetic technique revealed that the limit of resolution is 0.004 inch armature travel per bit when using 0.010-inch diameter matrix rods. The limit of resolution is 0.002-inch armature travel per bit when using 0.005-inch diameter matrix rods. The theoretical analysis revealed that only essential sense windings in a given digit, those adjacent to a zero-one transition, require a large number of turns. Sense windings of several turns in the other locations are adequate to sustain the signal between transitions. Experimental matrices having a resolution of 0.004 of an inch armature travel per bit were successfully fabricated. The binary digit of these units were uniform within 10% of each other. A seven-bit absolute digital altitude transducer was designed and fabricated. The transducer had a resolution of 0.013 of an inch armature travel per bit and a range of 0 to 23,000 feet. The transducer had an accuracy of ± two-bits at laboratory ambient temperature. Of this, ± one-bit is the quantizing error and ± one-bit is the hysteresis error. When exposed to temperature extremes of -10 and 70 C., the digital output indicated 1,500 feet low and 600 feet high, respectively. When checked for repeatability, the transducer indicated within ±75 feet of the selected altitude. (Author)

AD-295 693 Div. 30
(TISTP/FR) OTS price $8.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
SICOSAS, AN IBM 7090 COMPUTER ASSEMBLY PROGRAM FOR THE CDC 160-A COMPUTER,
by J. D. Drinan. 17 Jan 63, 95p. incl. illus.
(Rept. no. 21 G-8)
(Contract AF 19(628)500)
(AFESD TDR 63-14) Unclassified report

DESCRIPTORS: *Programming, Digital computers.

SICOSAS is a symbolic assembly program designed to operate on the IBM 7090 for the purpose of merging many of the desirable features of two of CDC's programming systems, SICOM and OSAS-A, into a single programming system in order to make the CDC 160-A computer a more versatile tool for many applications. This memo is aimed at those who have had some background in the IBM 7090 computer and its associated SOS programming system as well as in the CDC 160-A computer with its OSAS-A and SICOM programming systems. Input cards are punched in the familiar SOS format. Output is an SOS-like program listing plus a binary copy of the assembled program on magnetic tape which is readily loaded and executed on the 160-A. (Author)

AD-295 696 Div. 30, 15
(TISTP/VGW) OTS price $5.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
METHODS OF INCREASING REDUNDANCY IN A CLASS OF PATTERN RECOGNITION SYNTHESIS ALGORITHMS: AN EXPERIMENTAL STUDY.
Technical report on Mathematics,
by R. L. Mattson, O. Firschein, and M. Fischler.
Sep 62, 56p. incl. 12 refs. (Rept. no. 6-90-62-83)
Unclassified report

DESCRIPTORS: *Statistical analysis, *Digital computers, Switching circuits, Linear systems, Metamathematics, Mathematical logic, Numbers, Machine translation, Signal-to-noise ratio, Language.

An algorithm is investigated which synthesizes a network of threshold elements designed to perform pattern recognition. Basic concepts of feature space geometry, threshold devices and networks in their application to pattern recognition are discussed. Four methods for developing a synthesis algorithm are presented. The fourth, the Multiple Threshold per Class with Minimal Weights method, is the basis for the algorithm used in the investigation. The technique of determining weight and threshold is presented. The purpose of the experiments was to devise methods for increasing the generalization ability of the synthesis algorithm. The two basic approaches were: (1) modification of data presented to the algorithm, which can be accomplished by increasing the size of the organizing set and increasing the noise in the organizing set; and (2) revision of the basic algorithm by starting with non-zero weights; it was concluded that for a feature-word space consisting of ideal characters with additive noise, best results can be obtained with an algorithm which used initial correlated weights. (Author)

AD-295 759 Div. 30, 9
(TISTA/VGW) OTS price $3.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
A CALORIMETRIC INVESTIGATION OF SOME PROBLEMS ASSOCIATED WITH A LOW-DENSITY HYPERVELOCITY WIND TUNNEL,
by G. D. Arney, Jr. and D. E. Boylan. Feb 63, 27p. incl. illus. 8 refs. (Rept. no. AEDC TDR 63-19)
(Contract AF 40(600)1000, Proj. 8953)
Unclassified report

DESCRIPTORS: *Hypersonic wind tunnels, *Hypersonic flow, Instrumentation, Calorimeters, Heat transfer, Calibration, Effectiveness, Superaerodynamics, Electric arcs, Enthalpy.

AD-295 776 Div. 30, 25, 4
(TISTM/EJH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A THERMOCHEMICAL GAS ANALYZER FOR CONTINUOUS DETECTION OF OXYGEN,
by G. P. Tsyplyatnikov and V. B. Aleskovskiy. 8 Jan 63, 17p. incl. illus. tables, 5 refs. (Trans. no. FTD-TT-62-1554 from Izvestiya Vysshikh Uchebnykh Zavedeniy, Khimiya i Khimicheskaya Tekhnologiya, 3:3, pp. 550-559, 1960)
Unclassified report

DESCRIPTORS: *Oxygen, *Laboratory equipment, *Thermocouples, Gas detectors, Hydrogen, Combustion, Platinum, Iridium, USSR, Catalysts, Thermochemistry, Thermoelectricity, Detection.

A working model of a thermochemical gas analyzer for continuous detection of oxygen in gaseous mixtures containing up to 10% O2 has been constructed and tested under laboratory conditions. The action of the gas analyzer is based on using the relationship of the emf of a platinum and iridium platinum thermocouple, on which flameless hydrogen combustion occurs at a temperature in the gaseous medium of 250-300 degrees due to the oxygen in the gas to be analyzed. The research data may be used for developing an automatic gas analyzer for continuous detection of oxygen directly in a stream of hot gas. (Author)

AD-295 795 Div. 30, 2
(TISTP/JW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AN EXPERIMENT IN USING THE ELECTRONIC COMPUTER ''STRELA'' FOR PROCESSING MEASUREMENTS OF METEORIC PHOTOGRAPHS,
by A. K. Sosnova. 23 Jan 63, 13p. (Trans. no. MCL-1201 from Byul. Komissii po Kometam i Meteoram Astronomicheskogo Soveta. AN SSSR, No. 4, pp. 35-41, 1959)
Unclassified report

DESCRIPTORS: *Computers, *Meteors, Translations, USSR, Measurement, Photographic analysis.

AD-295 797 Div. 30
(TISTB/DGH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SCIENCE AND TECHNOLOGY.
21 Jan 63, 3p. (Trans. no. FTD-TT-62-1875 from Nedelya, No. 6, 1p., 4-10 Feb 1962)
Unclassified report

DESCRIPTORS: *Scientific organizations, *USSR, Electrochemistry, Biophysics, Amino acids, Ocean currents, Polymers, Archaeology, Conferences, Scientific research.

The traditional annual assembly of the Academy of Science USSR met during the week 6-7 February in the House of Scientists. The assembly was opened by the President of the Academy of Sciences USSR, Academician M. V. Keldysh. Academician Ye. K. Fedorov, Scientific Secretary General of Presidium of the Academy of Sciences USSR, reported on results of scientific activities of the Academy during the past year. (Author)

AD-295 821 Div. 30, 8, 25
(TISTB/MS) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PROBLEM LABORATORY STIMULATES GREATER CREATIVE WORK,
by A. A. Vorob'ev and G. A. Andreyev. 3 Jan 63, 8p. (Trans. no. FTD-TT-62-955 from Vestnik Vysshey Shkoly, No. 8, pp. 48-51, 1960)
Unclassified report

DESCRIPTORS: *Scientific research, *Scientific organizations, Semiconductors, Dielectrics, Electronics, Stimulation, Laboratories, USSR.

AD-295 822 Div. 30
(TISTB/MS) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A SHIFT REGISTER-DECODER,
by Ye. M. Martynov. 10 Jan 63, 5p. incl. illus. (Trans. no. FTD-TT-62-1436 from Soviet Patent No. 131777 (647108/26) 14 Dec 1959)
Unclassified report

DESCRIPTORS: *Frequency shift converters, *Memory devices, Computers, Transistors, Data storage systems, USSR, Circuits, Magnetic cores.

Division 31 - SHIPS AND MARINE EQUIPMENT
Division 32 - MISCELLANEOUS ARTS AND SCIENCES

AD-295 952 Div. 30, 32
(TISTB/RD) OTS price $1.60

RAND Corp., Santa Monica, Calif.
DETAB-X AND THE WORLD OF BANKING,
by Solomon L. Pollack. Feb 63, 12p. incl. table, 6 refs. (Rept. no. P-2697)
Unclassified report

Prepared for presentation at the 15th Annual Conference of the National Association of Mutual Savings Banks, 14 Feb 1963, Boston, Mass.

DESCRIPTORS: *Banking, *Data processing systems, *Computers, Automation, Programming.

31. SHIPS AND MARINE EQUIPMENT

AD-294 925 Div. 31
(TISTM/SJR) OTS price $2.60

David Taylor Model Basin, Washington, D. C.
THE DEVELOPMENT AND EVALUATION OF THE TMB CABLE TENSION AND FOOTAGE INDICATION SYSTEM,
by Denny F. Brown. Jan 63, 24p. incl. illus. 5 refs. (Rept. no. 1701)
(Proj. S-F 013 05 09)
Unclassified report

DESCRIPTORS: *Mooring, *Test equipment, *Test methods, *Cable assemblies, *Ships, Cable reels, Tensiometers.

The operation and evaluation of a portable system designed to measure tension and footage payout remotely and continuously on a stationary or moving cable are presented. During tests of the system, accurate readings were obtained for static cable tensions up to 70,000 lbs, moving cable tensions up to 45,000 lbs, and cable payout speeds up to 70 ft min. Utilization of the system on sea trials indicated that it is reliable and durable. (Author)

AD-295 002 Div. 31, 9
(TISTA/FRL) OTS price $2.60

Columbia U., New York.
INERTIA TERMS ASSOCIATED WITH SMALL MOTIONS OF A SUBMERGED FLEXIBLE RECTANGULAR CYLINDER,
by Jacob Lubliner and Hans H. Bleich.
Nov 62, 21p. illus. 4 refs. (Technical rept. no. 30; CU-1-62)
(Contract Nonr-26686, Proj. NR 064-428)
Unclassified report

DESCRIPTORS: *Ships, *Fluids, Analysis, Ship models, Elasticity, Cylindrical bodies, Floating bodies, Liquids, Deformation, Mathematical analysis, Shock waves, Underwater explosions, Velocity.

An expression for the kinetic energy of an infinite liquid mass due to small motions of a submerged cylinder is obtained analytically. When the motion is described in terms of generalized coordinates, the corresponding inertia coefficients appear in the kinetic-energy expression. The analysis is carried out for the problem of a floating flexible rectangular box. Calculations are performed for generalized coordinates representing rigid-body motion and plastic deformation. (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

AD-294 994 Div. 32
(TISTB/DGH) OTS price $1.60

RAND Corp., Santa Monica, Calif.
WHAT IS RESOURCE ANALYSIS,
by G. H. Fisher. Jan 63, 14p. (Rept. no. P-2688)
Unclassified report

Presented to a seminar on resource analysis held at the RAND Corp., Jan 63, Santa Monica, Calif.

DESCRIPTORS: *Costs, *Economics, Theory, Effectiveness, Management engineering, Scheduling, Federal Government, Operations research, Analysis, Decision making.

A discussion is provided as a basis for understanding the meaning of resource analysis. The specific meaning is heavily dependent upon the context of the particular problem at hand, and sketched briefly are the main features of several possible contexts. An outline of the major characteristics of a resource analysis capability designed primarily to serve a long-range planning type of context is presented. While adherence to these characteristics is fundamentally important in developing and operating a resource analysis activity, this alone will not assure good analytical studies. The results of resource analysis are heavily dependent upon experience, good judgment, ingenuity in creating and using analytical methods and techniques and, above all, just plain hard work. (Author)

AD-294 995 Div. 32
(TISTB/DGH) OTS price $1.60

RAND Corp., Santa Monica, Calif.
INDONESIA: TOWARDS DEVELOPMENT OR EXPANSIONISM,
by Guy J. Pauker. Jan 63, 13p. refs.
(Rept. no. P-2690)
Unclassified report

DESCRIPTORS: *Indonesia, Political science, Social sciences, History, Warfare, Growth.

AD-295 128 Div. 32
(TISTB/DGH) OTS price $3.60

RAND Corp., Santa Monica, Calif.
SUBURBANIZATION OF EMPLOYMENT AND POPULATION 1948-1975,
by John H. Niedercorn and John F. Kain. Jan 63, 38p. incl. illus. tables (Rept. no. P-2641)
(In cooperation with Air Force Academy, Colo.)
Unclassified report

Presented at the meetings of the Highway Research Board held on 11 Jan 63, in Washington, D. C.

DESCRIPTORS: *Population, *Urban areas, *Economics, Industry, Probability, Distribution, Mathematical prediction, Labor, Transportation, Simulation.

Analysis of data from the Censuses of Population, Manufactures, and Business indicates that during the post World War II period very little population and employment growth took place in the largest cities. Predictions made with an econometric model indicate that these trends are likely to continue in the future. The significance of these findings for urban development and transportation planning are explained. (Author)

AD-295 562 Div. 32
(TISTB/MS) OTS price $7.60

RAND Corp., Santa Monica, Calif.
SOVIET EXPENDITURES ON SCIENTIFIC RESEARCH,
by Nancy Nimitz. Jan 63, 64p. incl. tables. refs. (Research memo. RM 3384-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *USSR, *Scientific research, Economics, Costs.

AD-295 628 Div. 32
(TISTB/MD) OTS price $10.50

Institute for Cooperative Research, U. of Pennsylvania, Philadelphia.
SOME AVAILABLE MACHINED TEXT OF SCIENTIFIC PAPERS,
by John O'Connor. 1963, 124p.
(Contract Nonr-55135 and Grant AF-AFOSR-62-257)
Unclassified report

DESCRIPTORS: *Documentation, Pharmacology, Scientific reports.

The texts of several hundred papers from a pharmaceutical research collection which have been keypunched, are listed in this bibliography. The index terms in the bibliography are those given the documents at Merck. This statement is to indicate the availability to others, at cost, of this machined text. The punching has been done as an aid to mechanized indexing research. The documents punched are mostly a random selection from the ten thousand documents subject indexed in 1955 for the Merck Sharp and Dohme Research Laboratories retrieval system (West Point, Penna.). Foreign language papers have not been punched. Reviews (so indexed at Merck) have usually not been punched, because they offer a special problem for mechanized indexing and because they tend to be quite long. If copies of some or all of the punched cards are desired, temporary release of the punched card file for copying may be arranged. (Author)

AD-295 654 Div. 32
(TISTB/DGH) OTS price $2.60

RAND Corp., Santa Monica, Calif.
WATER SUPPLY, ECONOMICS, TECHNOLOGY AND POLICY,
by James C. DeHaven. Jan 63, 21p. (Rept. no. P-2694)
Unclassified report

DESCRIPTORS: *Water supplies, Feasibility studies, Economics.

Improper and subsidized pricing of water have led to a typical pattern of overbuilding of water supplies despite the often-heard claims of 'shortages.' These pricing practices, and imperfections in water law and its administration, have led to a great waste in the use of water. The current emphasis in water appears to be all on increasing present local supplies through the constructing of new dams and long aqueducts and on the semimystical goal of sea-water conversion. It is strongly suggested that the correct application of economic principles to the distribution of present water supplies, especially pricing in proper relation to cost, will so extend these present supplies through the reduction of waste that many of the grandiose schemes for increasing supplies can be put off for the future. (Author)

AD-295 761 Div. 32
(TISTP/JW) OTS price $18.00

American Systems, Inc., Hawthorne, Calif.
STUDY OF INTERFERENCE ASPECTS OF FRESNEL REGION PHENOMENA. VOLUME II. HANDBOOK FOR NEAR FIELD COMPUTATIONS.
Final rept.,
by R. A. Gerlock. 1 Aug 62, 282p. incl. illus. tables (Technical rept. no. 62-ESD-14)
(Contract AF 30(602)2507, Proj. 4540)
(RADC TDR 62-496, vol. 2) Unclassified report

DESCRIPTORS: *Antennas, *Energy, Azimuth, Beams, Reliability, Errors, Handbooks, Tables, Interference, Distribution.

A systematic technique is presented by which the near zone fields of in-phase rectangular and circular apertures can be readily calculated. The technique is applicable to a wide variety of antennas, which may vary in both size and aperture distribution. The calculations involve tabulated sets of field components, presented in Appendix I for circular apertures and Appendix II for rectangular apertures. The effects of various aperture distributions are accounted for by appropriately weighting each component, and the near fields are calculated by simply adding the weighted components. The technique for calculating the near zone fields is thoroughly illustrated by sample problems. (Author)

AD-295 835 Div. 32
(TISTP/JW) OTS price $9.60

American Systems, Inc., Hawthorne, Calif.
STUDY OF INTERFERENCE ASPECTS OF FRESNEL REGION PHENOMENA. VOLUME I. MATHEMATICAL DEVELOPMENT OF NEAR FIELD THEORY.
Final rept.,
by R. A. Gerlock. 1 Aug 62, 107p. incl. illus. 22 refs. (Technical rept. no. 62-ESD-14)
(Contract AF 30(602)2507, Proj. 4540)
(RADC TDR 62-496, vol. 1)
Unclassified report

DESCRIPTORS: *Antennas, *Mathematical analysis, Energy, Distribution, Reliability, Errors, Azimuth, Beams, Interference, Theory.

33. TRANSPORTATION

No Entries

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

*Descriptors marked with an asterik are included in the subject index.

BIBLIOGRAPHY

TID-17351 OTS $5.60

New Mexico U. Engineering Experiment Station, Albuquerque.
THE EFFECT OF RADIATION ON THE MECHANICAL PROPERTIES OF POLYMERS. BIBLIOGRAPHY, by R. K. Traeger. Sep 62, 59p. SCDC-2911

Order from GPO $1.00 as LC-33.2:Ae-8/3

Science and Technology Div., Library of Congress, Washington, D. C.
AERONAUTICAL AND SPACE SERIAL PUBLICATIONS, A WORLD LIST, by Marvin W. McFarland. 1962, 264p. 4551 refs.

DESCRIPTORS: *Bibliography, *Aeronautics, *Astronautics.

ASTRONOMY

Astrophysics

AD-281 120 OTS $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
RELATIONSHIPS BETWEEN H-ALPHA LINE WIDTH, INTENSITY, AND FLARE AREA, by Elske v. P. Smith Jan 62, 30p. 6 refs. GRD Research notes no. 74; AFCRL 62-226; NASA N62-11356.

DESCRIPTORS: *Solar flares, *Astronomical data, Statistical analysis, *Statistical functions.

The relationship between several parameters of the H-alpha line at or near maximum is studied. These parameters are line width, central intensity, and flare area. The data were obtained from the I. A. U. Quarterly Bulletin. The correlations between any two of the three characteristics are quite loose, with large amounts of scatter as shown in the appended figures. (Author)

AD-280 448 OTS $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
THE OPTICAL RECTIFICATION OF FORESHORTENED FLARES, by Henry J. Smith. Jan 62, 13p. 3 refs. GRD Research notes no. 75; AFCRL 62-232; NASA N62-11355.

DESCRIPTORS: *Solar flares, Optical analysis, Corrections, Astronomical data.

This note describes an analogue technique for rectifying the area of foreshortened flares near the solar limb. The method yields a virtual correction by the secant formula, with correct weighting of the correction factor at each point in the flare. The examples discussed illustrate the difficulties of measuring the areas of complex flares. (Author)

AD-281 175 OTS $1.10

Center for Radiophysics and Space Research, Cornell U., Ithaca, N. Y.
THEORETICAL RESEARCH IN ASTROPHYSICS, by T. Gold. Final rept. 1 June 60-31 Mar 62, on Contract AF 49(638)915. 30 Apr 62, 7p. 5 refs. Rept. no. CRSR 118; AFOSR 2539; NASA N62-13133.

DESCRIPTORS: Theory, *Astrophysics, Galaxies, Hydrogen, Molecules, Moon, Antennas, Plasma sheaths, Electromagnetic properties, Infrared radiation, Particles, Terrestrial magnetism, Magnetic fields, Interstellar matter.

Brief summaries are given of research on the abundance of molecular hydrogen in the galaxy; the hydrogen atmosphere of the moon; the interaction of a tenuous plasma with an antenna; infrared astronomy; plasma and magnetic fields in the solar system; magnetic effects of geomagnetically trapped particles; general relativity; and dynamics of grains.

NASA N63-12150 OTS $8.10

Enrico Fermi Inst. for Nuclear Studies, U. of Chicago, Ill.
THEORY OF RECONNECTION AND ANNIHILATION OF MAGNETIC FIELDS WITH APPLICATION TO SOLAR FLARES AND INTERSTELLAR SPACE, by E. N. Parker (National Center for Atmospheric Research). Rept. on Grant NsG-96-60. [1962] 85p. 55 refs.

NASA N63-12063 OTS $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
MATHEMATICAL ANALYSIS FOR THE ORIENTATION AND CONTROL OF THE ORBITING ASTRONOMICAL OBSERVATORY SATELLITE, by Paul B. Davenport. Jan 63, 19p. Technical note D-1668.

NASA N63-12064 OTS $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
SEPTEMBER 26, 1960 SOLAR COSMIC RAY EVENT, by C. E. Fichtel, D. A. Kniffen, and K. W. Ogilvie. Jan 63, 9p. 17 refs. G-263; Technical note D-1675

PB 162 808 OTS $3.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE RADIATION BALANCE OF VENUS, by Carl Sagan. Rept. on Contract NASw-6 and Grant NSF G4140 15 Sep 60, 31p. 75 refs. Technical rept. no. 32-34; AD-248 907.

DESCRIPTORS: *Infrared radiation, *Venus, *Albedo (Astronomy), Surface temperatures, Van Allen radiation belt, Water vapor, Planetary atmospheres, Absorption, Clouds, Abundance.

Recent microwave observations of Venus give brightness temperatures near 600 deg K. The spectrum precludes an origin as synchrotron or cyclotron radiation from a Cytherean Van Allen belt; the emission must be thermal and probably arises from just beneath the surface of Venus. The radiation temperature of an airless planet with Venus' color-corrected albedo and solar distance is about 250 deg K if the period of rotation is much less than the period of revolution or if there is appreciable interhemispheric circulation; or about 350 deg K if the two periods are comparable. A surface temperature of 600 deg K demands a very efficient greenhouse effect. From the radiation balance, the effective absorptivity of the atmosphere, integrated over all wave-lengths, is about 0.995 for nonsynchronous rotation; the equivalent atmosphere is opaque between 1.5 and 40 microns. Water is the only molecule which is likely to be abundant on Venus. The absence of surface liquid water inhibits the establishment of the Urey equilibrium and reduces tidal friction. Because of the high temperature and the absence of liquid water, it is unlikely that contemporary indigenous organism exists on the surface of Venus. (Author)

PB 162 807 OTS $3.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SELENOGRAPHIC COORDINATES, by B. E. Kalensher. Rept. on Contract NASw-6. 24 Feb 61, 35p. 7 refs. Technical rept. no. 32-41.

DESCRIPTORS: *Lunar probes, *Equations of motion, *Lunar satellites, Satellite vehicle trajectories, Moon, Gravity, Rotation, Geophysics, Inertia.

The Moon's triaxial, gravitational potential and its complex, rotary motion (libration) are incorporated in the equations of motion of a space vehicle in the near vicinity of the Moon. A transformation is derived between the space-fixed coordinate system, centered in the Moon, in which the vehicle's motion is computed, and a coordinate system fixed in the lunar body, i.e., a coordinate system which rotates with the Moon. Finally, an expression is derived for computing the velocity of the space vehicle in the Moon-fixed coordinate system. (Author)

NASA N63-12244 OTS $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
THE EFFECT OF VACUUM ON THE PENETRATION CHARACTERISTICS OF PROJECTILES INTO FINE PARTICLES, by Leonard V. Clark and John Locke McCarty. Jan 63, 27p. 11 refs. Technical note D-1519.

NASA N63-12062 OTS $0.50

National Aeronautics and Space Administration, Washington, D. C.
DIRECT MEASUREMENTS OF COSMIC DUST SHOWERS, by M. Dubin. Jan 63, 12p. 14 refs. Technical note D-1544.

BEHAVIORAL SCIENCES

TID-15493 OTS $1.10

Sandia Corp., Albuquerque, N. Mex.
EMPLOYEE EVALUATION: AN ABSTRACT MODEL, by Thomas F. Marker. Rept. on Contract AT(29-1)789 23 Apr 62, 10p. SCDC-2618.

Personnel and Training

PB 162 496 OTS $4.60

[Institute of Geodesy, Photogrammetry and Cartography] Ohio State U. Research Foundation, Columbus.
THE EFFECT OF IMAGE DEGRADATION ON VISUAL SEARCH: AERIAL HAZE, by Clark Townsend, Glenn A. Fry, and Jay M. Enoch. Rept. on Human Aspects of Photographic Interpretation, Contract AF 30(602)1580. Jan 58, 42p. 13 refs. Technical paper no. (696)-13-269; RADC-TN-58-275.

DESCRIPTORS: *Map reading, *Photographic analysis Aerial photographs, Optical systems, *Display systems, *Visual perception, *Target recognition, Optical images, Degradation, Haze, Human engineering.

The effect of general contrast reduction of photographic displays simulating the effect of aerial haze on search was considered in this study. It was found that when the photograph is degraded in this manner, it takes a longer period of time to locate critical details. Further, it was found that the average duration of eye fixations increases as the over-all contrast is reduced, and the average extent of individual eye movements decreases as the over-all contrast is reduced. In brief, a smaller area is covered per unit search time. The implications of these findings are discussed at length, and a suggested approach to the selection of photographs to be analyzed has been considered. (Author)

PB 162 498 OTS $2.60

[Institute of Geodesy, Photogrammetry and Cartography] Ohio State U. Research Foundation, Columbus.
THE EFFECT OF IMAGE DEGRADATION ON VISUAL SEARCH: BLUR, by Jay M. Enoch. Rept. on Human Aspects of Photographic Interpretation, Contract AF 30(602) 1580. Jan 58, 25p. 9 refs. Technical paper no. (696)-16-280; RADC-TN-59-63; AD-220 225.

DESCRIPTORS: *Map reading, *Photographic analysis, Aerial photographs, Optical systems, *Display systems, *Visual perception, Optical images, Degradation, *Target recognition, Human engineering.

The effect of blur on visual search was studied. The modified ophthalmograph apparatus was employed. It was found that as blur increased, average duration of fixation increased, and average interfixation distance decreased. These findings indicate less area is covered per unit time on degraded material. Since these findings

are very similar to those obtained using aerial haze as a form of degradation, one may generalize these findings to other forms of degradation. The implications of these findings are discussed. (Author)

PB 162 495 OTS $3.60

[Institute of Geodesy, Photogrammetry and Cartography] Ohio State U. Research Foundation, Columbus. THE EFFECT OF LIMITING THE TIME ALLOWED FOR SEARCH UPON VISUAL SEARCH PATTERNS, by Morton W. Richman, Jay M. Enoch, and Glenn A. Fry. Rept. on Human Aspects of Photographic Interpretation, Contract AF 30(602)1580. Jan 58, 35p. 4 refs. Technical paper no. (696)-12-268; RADC-TN-58-234.

DESCRIPTORS: *Map reading, *Photographic analysis, Aerial photographs, Optical systems, *Display systems, *Visual perception, *Target recognition, Time, Human engineering.

This investigation reveals that the search behavior of observers changes in relation to given conditions, with special reference to time factors controlled by the investigators during the tests. Of the two groups of observers tested it is noted that the group receiving instructions limiting search time showed a somewhat accelerated aptitude in the modification of search behavior. (Author)

PB 162 499 OTS $3.60

[Institute of Geodesy, Photogrammetry and Cartography] Ohio State U. Research Foundation, Columbus. THE EFFECT OF THE SIZE OF THE DISPLAY ON VISUAL SEARCH, by Jay M. Enoch. Rept. on Human Aspects of Photographic Interpretation, Contract AF 30(602)1580. Jan 58, 36p. 8 refs. Technical paper no. (696)-15-279; RADC-TN-59-64.

DESCRIPTORS: *Map reading, *Photographic analysis, Aerial photographs, Optical systems, *Display systems, Sizing, *Visual perception, *Target recognition, Human engineering.

Twelve subjects were presented an ordered series of experimental aerial maps of different size. Their eye traces were recorded on a modified ophthalmograph while they searched for a specific critical detail. As was noted in other experiments of this series, coverage of the display was not uniform. In particular, greatest attention was paid to the center of the display. Search behavior in displays subtending 9^{o} and larger at the eye remained essentially the same. For smaller displays, marked differences were noted. As the size of the display decreased, durations of fixation increased, interfixation distances decreased, concentration of attention in the central area increased, and efficiency decreased. Efficiency is defined as percent of eye fixations falling within the display area. The implications of these findings are discussed. (Author)

PB 162 506 OTS $2.60

[Institute of Geodesy, Photogrammetry and Cartography] Ohio State U. Research Foundation, Columbus FUSION OF THE LINES OF A TELEVISION DISPLAY by Glenn A. Fry. Rept. on [Human Aspects of Photographic Interpretation] Contract AF 30(602)1580. Sep 60, 24p. 2 refs. Technical paper no. (696)-24; RADC-TN-60-217; AD-251 217.

DESCRIPTORS: *Television display systems, Pictures, Optical images, *Focusing, *Aerial reconnaissance, *Photographic analysis, Photographic intelligence.

This study is concerned with the use of pictures transmitted by television for stereoviewing and cover comparison. In both situations it is desirable to get rid of the line grain in the television display. This is a study of the feasibility of blurring the lines of the television display into each other. With a Gaussian aperture and a (Behavioral Sciences--Human Engineering, 5 May 63) pair of crossed cylinders it is possible to create a blur in a direction perpendicular to the scan lines. A ground glass was also used to produce a blur in both directions. Both methods of blurring were tested using various kinds of test objects. Mathematically it can be shown that the ideal type of blur for this purpose is one with a blur function that conforms to the normal curve. Blur in a direction perpendicular to the scan lines is much better than blur in all directions. Less information is lost. A special technique for printing positives from negatives was proposed. (Author)

PB 162 497 OTS $3.60

[Institute of Geodesy, Photogrammetry and Cartography] Ohio State U. Research Foundation, Columbus. THE EFFECT ON VISUAL SEARCH OF THE DEGREE OF GENERALITY OF INSTRUCTIONS TO THE PHOTOINTERPRETER, by Jay M. Enoch. Rept. on Human Aspects of Photographic Interpretation, Contract AF 30(602)1580. 38p. 8 refs. Technical paper no. (696)-14-270; RADC-TN-58-299.

DESCRIPTORS: *Map reading, *Photographic analysis, Aerial photographs, Optical systems, *Display systems, *Visual perception, *Target recognition, Human engineering.

One of the main variables affecting a search pattern is the nature of the instructions given the photointerpreter. In this study photointerpreters were asked to locate a class of objects. In two separate parts essentially identical findings were found. A less specific instruction results in a more generalized search pattern. However, the tendency to concentrate attention at the center of the display is strongly evident as are other biases. Marked differences in approach to a given problem and in ability to handle a given problem were found. They were discussed in terms of division of the work load of photointerpreters. (Author)

PB 162 505 OTS $4.60

[Institute of Geodesy, Photogrammetry and Cartography] Ohio State U. Research Foundation, Columbus. MODIFICATION OF SEARCH BEHAVIOR WITH SPECIAL EMPHASIS ON FEEDBACK ENHANCEMENT TECHNIQUES, by Jay M. Enoch, Glenn A. Fry, and Clark A. Townsend. Final rept. on [Human Aspects of Photographic Interpretation] Contract AF 30(602)1580. July 59, 43p. 11 refs. Technical paper no. (696)-25; RADC-TN-59-368; AD-241 285.

DESCRIPTORS: Eye, Motion, Measurement, *Visual after-images, *Map reading, Ophthalmology, Test methods, Visual perception, Behavior, Maps, Aerial photographs.

Eye movement photographs were made for a group of eight subjects under conditions of free search as well as with an automatic scanning apparatus. In addition, the subjects were instructed to search by scanning in a boustrophedon pattern similiar to the pattern presented by the automatic scanning apparatus. Half of the group obtained enhanced feedback information by means of a simple after-image method, which aided them in knowing where they were momentarily fixating. The effect of these various methods upon search behavior was investigated from the point of view of durations of fixation, extents of eye movement, patterns of eye movements and uniformity of display coverage. Particular attention is given to the potential uses of feedback enhancement by means of after-images in the search situation. (Author)

PB 162 502 OTS $7.60

[Institute of Geodesy, Photogrammetry and Cartography] Ohio State U. Research Foundation, Columbus.
THE RELATION OF BLUR AND GRAIN TO THE VISIBILITY OF CONTRAST BORDERS AND GRATINGS, by Glenn A. Fry and Jay M. Enoch. Rept. on [Human Aspects of Photographic Interpretation] Contract AF 30(602)1580. Apr 59, 73p. 9 refs. Technical paper no. (696)-19-293; RADC-TN-59-237.

DESCRIPTORS: *Map reading, *Photographic analysis, *Aerial photographs, Visibility, Optical systems, *Display systems, *Visual perception, *Target recognition, Human engineering.

Contents:
Relation of amount of blur, luminance level and contrast to the visibility of a border
The effect of blur and grain upon visibility of a border
The relation of type of blur to the effect of blur upon the visibility of a border
The relation of type of blur to the effect of blur on the resolution of a grating
Effect of grain on the resolution of a grating.

PB 162 501 OTS $7.60

[Institute of Geodesy, Photogrammetry and Cartography] Ohio State U. Research Foundation, Columbus.
VISUAL PERCEPTION OF THE ORIENTATION OF A LANDOLT RING, by Jay M. Enoch and Glenn A. Fry. Rept. on [Human Aspects of Photographic Interpretation] Contract AF 30(602)1580. Apr 59, 73p. 7 refs. Technical paper no. (696)-18-292; RADC-TN-59-236.

DESCRIPTORS: *Map reading, *Photographic analysis, Aerial photographs, Luminescence, Optical systems, *Display systems, *Visual perception, *Target recognition, Visual thresholds, Stimulation, Conditioned reflex, Human engineering.

Contents:
Studies performed in other laboratories
General outline of the study
The stimulus pattern
Apparatus and procedure
First major experiment: luminance level; duration and contrast
Time required to respond to the presence of a landolt ring
Second major experiment: rate, size and contrast
Self pacing
Effect of reinforcement, practice and fatigue
Reliability of the data for a given run
Contrast threshold for detecting the presence of the landolt ring

PB 162 500 OTS $1.60

[Institute of Geodesy, Photogrammetry and Cartography] Ohio State U. Research Foundation, Columbus.
VISUAL SEARCH OF A COMPLEX DISPLAY: A SUMMARY REPORT, by Jay M. Enoch and Glenn A. Fry. Rept. on Human Aspects of Photographic Interpretation, Contract AF 30(602)1580. Apr 58, 18p. 12 refs. Technical paper no. (696)-17-282; RADC-TN-59-65; AD-220 221.

DESCRIPTORS: *Map reading, *Photographic analysis, Aerial photographs, Optical systems, *Display systems, *Visual perception, *Target recognition, Human engineering.

A brief review is given of results obtained in a series of eight experiments designed to identify the major factors encountered in search performance. The significance of, and applications of these several findings are discussed. (Author)

Psychology

PB 162 773 OTS $3.60

Coordinated Science Lab., U. of Illinois, Urbana.
CAREFUL: A PILOT STUDY OF THE EFFECTS OF HEAVY TARGET LOAD ON HUMAN AND AUTOMATIC DECISION MAKERS, by H. Wallace Sinaiko and Glenn P. Cartwright. Rept. on Contract DA 36-039-sc-56695. Sep 59, 39p. 10 refs. Rept. no. R-115; AD-228 109.

DESCRIPTORS: *Combat information centers, *Aircraft defense systems, *Reasoning, Computers, Aerial targets, Detection, Air combat analyzers, Human engineering, *Decision making, Automatic

A test was made of the hypothesis that heavy target loads would adversely affect a human tactical decision-maker while the same number of targets would not degrade the performance of an automatic system. A series of air defense exercises were conducted using the Cornfield system. Three levels of automaticity were introduced: (1) the system was programmed to run without any human intervention; (2) the fully automatic system had a CIC officer who could override computer decisions or make his own decisions if he chose to do so; and (3) a CIC officer had to make all decisions regarding threat evaluation and selection and assignment of weapons while the computers did only routine vectoring of interceptors. Results of the experiment did not support the hypothesis. Actually the more automatic versions of the system allowed more target penetrations and accomplished fewer kills than the least automatic mode.

PB 162 776 OTS $2.60

Iowa State U. [Iowa City].
DISCRETE MOVEMENTS TOWARD AND AWAY FROM THE BODY IN THE HORIZONTAL PLANE, by Judson S. Brown, Edward W. Wieben, and Eugenia B. Norris. Rept. no. 6 on Contract N5ori-57, proj. 2. Sep 48, 23p. 5 refs. ATI-38 305.

DESCRIPTORS: *Body, Motion, *Arms, *Hands, *Reaction time, Physiology, Tests, Determination, *Reaction (Psychology), Human engineering, *Psychomotor tests, Statistical analysis, Instrument dials, Instrument panels

Basic movement-conditions were altered so that the individuals were required to move along a line lying in the horizontal plane but perpendicular to the frontal plane of the body, i.e., toward and away from the front of the body along a horizontal surface. The major experimental variables were length of movement (2.5, 10, and 40 cm.) and direction of movement (inward and outward).

BIOLOGICAL SCIENCES

Anatomy and Physiology

TID-17215 OTS $3.60

Pittsburgh, U., Pa.
GENETIC POTENTIAL OF CERTAIN POPULATIONS OF DROSOPHILA PERSIMILIS, by Eliot B. Spiess. Rept. for 1955-1962, on Contract AT(30-1)1775. 30 Oct 62, 38p. 36 refs.

PB 162 775 OTS $5.60

University of Southern California, Los Angeles.
THE EFFECTS OF NEGATIVE RADIAL ACCELERATION ON LARGE EXPERIMENTAL ANIMALS (GOATS I. PATHOLOGY, by C. F. Lombard, E. L. Beckman and others. Rept. on Contract N6ori-77, task 1. 30 Nov 48, 58p. 5 refs. ATI-208 700.

DESCRIPTORS: Acceleration, *Centrifuges, *Acceleration tolerance, *Goats, Pathology, Adaptation (Physiology), *Hemorrhage, Nervous system, Edema, Larynx.

The effects of negative radial acceleration (centrifugal force acting from tail to head) upon 11 goats were studied on the human centrifuge at levels of -5 G and -8 G. Routine gross pathological examinations were made. These experiments indicate that repeated exposures to negative G produce considerable edema and numerous hemorrhages, both petechial and frank, in the tissues of the head and neck. Negative G seems to offer greater danger of strangulation by edema of the glottis and surrounding tissues and cardio vascular damage than by cerebral hemorrhage.

PB 162 854 OTS $2.60

Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.
THE VISCOELASTIC BEHAVIOR OF ISOLATED AORTIC STRIPS STUDIED BY MEANS OF A PARALLEL SPRING AND DASHPOT ANALOGUE, by Richard W. Lawton. 12 Oct 54, 29p. 11 refs. Rept. no. NADC-MA-5412; Bureau of Medicine and Surgery rept. no. NM 001 090.02.01; AD-44 468

DESCRIPTORS: *Blood vessels, *Aorta, Mechanical properties, Elasticity, Oscillation, Resonance, Test equipment, Springs, *Viscoelasticity.

Experimental observations on the dynamic viscoelastic behavior of isolated aortic strips are presented along with an analysis of the data made by employing a simple parallel spring and dashpot mechanical analog. Results indicate a similarity in behavior of isolated aortic strips micro-card available and other polymeric materials. The inadequacies of the method of analysis are discussed. (ASTIA abstract)

NASA N63-12235 OTS $1.60

Cedars of Lebanon Hospital, Los Angeles, Calif.
THE COMMON ORIGIN OF PRECORDIAL VIBRATIONS, by Clarence M. Agress, Stanley Wegner and others. Rept. on Grant NsG-289-62. [1962] 16p. 33 refs.

PB 162 257 Available on loan from OTS

School of [Aerospace] Medicine [Brooks AFB] Tex.
THE MULTIPLE FACTOR THEORY OF RESPIRATORY REGULATION. III: CHANGES IN SENSITIVITY TO CO_2 IN PROLONGED ACAPNIA AND HYPERCAPNIA, by John S. Gray. 21 Nov 45, 60p. 24 refs. Proj. no. 386, rept. no. 3; ATI-156 440.

DESCRIPTORS: *Respiration, *Carbon dioxide, Sensitivity, Adaptation (Physiology), Theory, *Hyperacapnia, Blood.

Increased sensitivity of the respiratory mechanism to arterial CO_2 tension provided a quantitatively adequate explanation of the exaggerated hyperventilation of chronic anoxia, of the respiratory responses to the superimposition of acute anoxia upon chronic anoxia, and of the failure of O_2 inhalation to relieve the dyspnea of chronic anoxia. This increased sensitivity to CO_2 was demonstrated as an increase in the slope of the specific CO_2 stimulus-response curve. The hypothesis is advanced that the respiratory mechanism adapts to all prolonged disturbances in CO_2 tension by changes in sensitivity of such direction and degree that the abnormal level produces the same partial effect on ventilation as the normal level does when the sensitivity is normal.

Biochemistry

TID-14888 $1.60

Argonne National Lab., Ill.
THE BIOSYNTHESIS OF S-ADENOSYLMETHIONINE BY SACCHAROMYCES CEREVISIAE. I. THE ADENINE AND METHIONINE REQUIREMENTS FOR SYNTHESIS, by Irving Yall. Rept. on Contract W31-109-eng-38. Dec 61, 16p. 13 refs. UAC-5918.

TID-17076 OTS $1.60

Arkansas U., Fayettesville.
STUDIES ON THE PHOSPHORYLATION CYCLE IN THE INTACT ANIMAL, by Jacob Sacks. Annual progress rept. on Contract AT(40-1)1521. 10 June 55, 16p. 3 refs.

BNL-6418 OTS $1.60

Brookhaven National Lab., Upton, N. Y.
EVIDENCE FOR AN INTERMEDIATE IN MYOSIN HYDROLYSIS, by Daniel E. Koshland, Jr., and Harvey M. Levy. 3 Dec 62, 13p. 8 refs.

Botany

TID-13140 OTS $2.60

Los Alamos Scientific Lab., N. Mex.
POPULATION STUDIES IN PREDOMINANTLY SELF-POLLINATED SPECIES. III. APPROACH TO FIXATION IN FINITE POPULATIONS COMPOSED OF MIXTURES OF PURE LINES, by George A. Baker, Jr., R. W. Allard and others. Rept. on Contract W7405-eng-36. 12 July 61, 28p. 11 refs. LADC-4946.

TID-14049 $1.60

Los Alamos Scientific Lab., N. Mex.
POPULATION STUDIES IN PREDOMINANTLY SELF-POLLINATED SPECIES. IV. STOCHASTIC PROCESSES AND GENOTYPIC FREQUENCIES UNDER MIXED SELFING AND RANDOM MATING, by R. W. Allard, George A. Baker, Jr. and others. Rept. on Contract W7405-eng-36. 10 Oct 61, 19p. 3 refs. LADC-4989.

Pharmacology and Toxicology

BNL-5772 OTS $2.60

Brookhaven National Lab., Upton, N. Y.
ACUTE INTRAVENOUS AND INTRAPERITONEAL BORATE TOXICITY AND ITS ALTERATION BY D-GLUCOSE AND AGE, by Otho D. Hasterday and Helen Hamel. 22 Jan 62, 27p. 7 refs.

AD-276 640, repriced OTS $2.00

Kettering Lab., U. of Cincinnati, Ohio.
TOXICITY OF BERYLLIUM, by J. Cholak, Robert A. Kehoe and others. Final technical engineering rept. June 58-Apr 60, on Contract AF 33(600)37211. Apr 62, 69p. 95 refs. ASD TR 62-7-665; NASA N62-13318.

DESCRIPTORS: *Beryllium, *Beryllium poisoning, *Toxicity, Industrial medicine, Control systems, Sampling, Chemical analysis, Colorimetric analysis, Spectrographic analysis, Ventilation, Medical examination, Bibliography.

This report includes descriptions of the effects of the absorption of Be and specific measures designed to prevent illness and maintain health among persons who work with Be. The report covers the history of Be disease, hygienic standards, environmental control procedures, sampling and analytical procedures, house keeping, personal hygiene and plant sanitation, and a medical program. Illustrations of ventilation controls are included. (Author) (See also PB 161 319)

Radiobiology

TID-14151 $1.10

Argonne National Lab., Ill.
THE APPARENT RETENTION OF CESIUM^{137} IN HUMAN RIB BONE, by Robert W. Anderson and Phillip F. Gustafson. Rept. on Contract W31-109-eng-38. Sep 61, 7p. 6 refs. UAC-5664.

BNL-6416 OTS $2.60

Brookhaven National Lab., Upton, N. Y.
ABSORPTION AND TURNOVER RATES OF IRON MEASURED BY THE WHOLE BODY COUNTER, by D. C. Price, S. H. Cohn, and E. P. Cronkite. 3 Dec 62, 26p. 10 refs.

BNL-6384 OTS $1.60

Brookhaven National Lab., Upton, N. Y.
INCORPORATION OF TRITIATED PYRIMIDINE NUCLEOSIDES AND AMINO ACIDS INTO LYMPHOCYTES DURING SECONDARY RESPONSE TO TETANUS TOXOID IN MICE, by H. Cottier, N. Odartchenko, and R. D. Stoner. 13 Nov 62, 17p. 6 refs.

BNL-5442 OTS $1.60

Brookhaven National Lab., Upton, N. Y.
LEUKOKINETIC STUDIES V. UPTAKE OF TRITIATED DIISOPROPYLFLUOROPHOSPHATE BY LEUKOCYTES, by Doris Kurth, J. W. Athens and others. 1961, 16p. 10 refs.

BNL-5415 OTS $1.10

Brookhaven National Lab., Upton, N. Y.
RNA-aes EFFECT ON INCORPORATION OF TRITIATED THYMIDINE INTO DNA AND TRITIATED CYTIDINE INTO RNA AND DNA IN HUMAN CANCER CELLS IN CULTURE (HeLa), by L. B. Feinendegen, V. P. Bond, and R. M. Drew. 18 July 61, 10p. 15 refs.

BNL-5989 OTS $1.60

Brookhaven National Lab., Upton, N. Y.
STUDIES OF CELL POPULATION KINETICS IN NORMAL AND CONTINUOUSLY IRRADIATED ANIMALS, by L. F. Lamerton, B. I. Lord, and Henry Quastler. 23 Apr 62, 19p. 15 refs.

TID-17225 OTS $1.10

Duke U., Durham, N. C.
THE EFFECTS OF ULTRAVIOLET LIGHT AND GAMMA RAYS ON CELL LIPIDS AND THE PHYSIOLOGICAL ACTION OF IRRADIATED LIPIDS, by Frederick Bernheim and Karl M. Wilbur. Final rept. on Contract AT(40-1)1647. 26 Mar 62, 7p. 15 refs.

HW-SA-2800 OTS $1.60

Hanford Atomic Products Operation, Richland, Wash.
BIOLOGICAL EFFECTS OF INTERNAL IONIZING RADIATION, by Roy C. Thompson. Rept. on Contract AT(45-1)1350. 19 Nov 62, 18p.

HW-SA-2764 OTS $1.10

Hanford Atomic Products Operation, Richland, Wash.
Cs-137 EXCRETION AND BODY BURDENS OF ALASKAN ESKIMOS, by H. E. Palmer, W. C. Hanson, and B. I. Griffin. Rept. on Contract AT(45-1)1350. [1962] 7p. 5 refs.

HW-SA-2763 OTS $1.60

Hanford Atomic Products Operation, Richland, Wash.
REMOVAL OF PLUTONIUM AND OTHER TRANSURANIC ELEMENTS FROM MAN, by W. D. Norwood. Rept. on Contract AT(45-1)1350. 16p. 26 refs.

TID-14791 OTS $1.10

Los Alamos Scientific Lab., N. Mex.
BIOLOGICAL RECOVERY FROM RADIATION INJURY, by J. F. Spalding. Rept. on Contract W7405-eng-36. 8 Feb 62, 10p. 9 refs. LADC-5207.

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FALLOUT I^{131} IN RENO CATTLE, by Clifton Blincoe. Rept. for Mar 59-May 60, on Contract AT(04-3)34. 4p. 6 refs.

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Western Reserve U., Cleveland, Ohio.
EFFECT OF IRRADIATION ON THE NATURE OF DNA AS EVIDENCED BY FRACTIONATION ON ECTEOLA, by Helen Harrington. Rept. on Contract W31-109-eng-78. 17 Mar 62, 16p.

CHEMISTRY

LAMS-2781 $0.50

Los Alamos Scientific Lab., N. Mex.
AN ISOTOPE EFFECT IN THE RECOMBINATION OF IODINE ATOMS, by Mark M. Rochkind. Rept. on Contract W7405-eng-36. Aug 62, 26p. 4 refs.

TID-17447 OTS $1.10

Argonne National Lab., Ill.
VALENCE BAND STRUCTURE OF SILVER CHLORIDE by Robert S. Knox, Franco Bassani, and W. Beall Fowler, Jr. Rept. on Contract W31-109-eng-38. Sep 62, 10p. 7 refs. UAC-6851.

DRI-2065 OTS $2.60

Denver Research Inst., Colo.
A STUDY OF THE SYNTHESIS AND PROPERTIES OF TRANSITION-METAL HYDRYLS, by Charles B. Magee. Quarterly progress rept. no. 1, 1 June-30 Sep 62, on Contract AT(11-1)1185. 15 Oct 62, 22p. 2 refs.

HW-SA-2246 OTS $2.60

Hanford Atomic Products Operation, Richland, Wash.
EXTRACTION OF TETRA- AND HEXAVALENT ACTINIDES FROM HYDROCHLORIC ACID BY TRI-N-OCTYLAMINE IN XYLENE, by W. K. Keder. Rept. on Contract AT(45-1)1350. 27 Oct 61, 21p. 24 refs.

UCRL-9801 OTS $2.60

Lawrence Radiation Lab., U. of California, Berkeley.
CHEMICAL REACTIONS IN CROSSED MOLECULAR BEAMS, by Dudley R. Herschbach. Rept. on Contract W7405-eng-48. July 61, 30p. 9 refs.

PB 162 811 OTS $1.60

[Army Chemical Research and Development Labs.] Army Chemical Center, Md.
ESTIMATION OF SMALL QUANTITIES OF CHLOROACETOPHENONE [CN] FOR CHAMBER AND FIELD TESTS, by Samuel Sass and Joyce J. Kaufman. 21 Mar 52, declassified 20 July 54. 12p. 10 refs. Rept. no. CRLR 29.

DESCRIPTORS: *Chemical warfare agents, *Poisonous gases, *Acetophenones, Chlorides, Detection, Chemical analysis, *Colorimetry, Chemical indicators.

A method was adapted for the estimation of microgram quantities of chloroacetophenone by reaction with m-dinitrobenzene in the presence of alkali and measurement of the resulting magenta color on a Klett-Summerson colorimeter. No interference was encountered due to the presence of fog oil, chloroform, or other components of the smoke mixture. The method was found to have a precision on the order of ±2% down to 10 mmg. and ±4% in the range of 5 mmg. (Author)

GAT-471 $0.50

Goodyear Atomic Corp., Piketon, Ohio.
AN IMPROVED TITRIMETRIC METHOD FOR THE PRECISE DETERMINATION OF URANIUM, by O. A. Vita, C. F. Trivisonno, and C. R. Walker. Rept. on Contract AT(33-2)1. 23 Nov 62, 9p. 8 refs.

PB 162 806 OTS $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
VOLUMETRIC DETERMINATION OF HYDROXYL IN POLYPROPYLENE GLYCOLS, by Eugene A. Burns and Ralph F. Muraca. Rept. on Contract NASw-6. 20 May 59, 21p. 12 refs. Progress rept. no. 30-11; AD-231 145.

DESCRIPTORS: Hydroxides, *Glycols, *Propenes, Polymers, Volumetric analysis, Determination, Molecular structure, Chemical analysis, Chemical reactions.

A critical study of the volumetric determination of hydroxyl content of polypropylene glycols by acetylation, phthalation, formylation, urethanation, and reduction with lithium aluminum hydride is presented. The effect of reaction time and reagent ratio on acetylation and phthalation is examined. Recommended acetylation and phthalation procedures are given together with a thorough discussion of the precision and accuracy of these methods. The calculation of polypropylene glycol molecular weights from hydroxyl concentration measurements is critically examined and a new method of calculation is offered. (Author)

Y-1406 $0.50

Union Carbide Nuclear Co., Oak Ridge, Tenn.
SPECTROPHOTOMETRIC DETERMINATION OF TRACE ARSENIC IN ALUMINUM ALLOYS, ALUMINUM, URANIUM, AND LEAD, by L. M. Steckel and J. R. Hall. Rept. on Contract W-7405-eng-26. 21 Sep 62, 18p. 9 refs.

Organic Chemistry

HW-SA-2797 OTS $3.60

Hanford Atomic Products Operation, Richland, Wash.
AMINES AS EXTRACTANTS - STUDIES OF THE ORGANIC PHASE, by W. E. Keder and A. S. Wilson. Rept. on Contract AT(45-1)1350. 1962. 37p. 48 refs.

HW-SA-2796 OTS $2.60

Hanford Atomic Products Operation, Richland, Wash.
THE NEUTRAL ORGANOPHOSPHORUS COMPOUNDS AS EXTRACTANTS, by L. L. Burger. Rept. on Contract AT(45-1)1350. 13 Nov 62, 29p. 66 refs.

IDO-11002 OTS $3.60

Monsanto Research Corp., Dayton, Ohio.
ORGANIC COOLANT ESSENTIAL DATA, by W. E. Ball, J. A. Ellard and others. Quarterly rept. no. 5, 1 Apr-30 June 62, on Contract AT(10-1)1088. 12 July 62, 34p. 14 refs.

Physical Chemistry

TID-17367 OTS $2.60

Duke U., Durham, N. C.
THERMODYNAMIC PROPERTIES OF FUSED SALTS, by Douglas G. Hill and John M. Chamberlin. Rept. on Contract AT(40-1)2479. 6 Dec 62, 29p.

TID-13772 OTS $2.60

Laboratory for Nuclear Science, Mass. Inst. of Tech., Cambridge.
DIFFERENTIAL THERMAL ANALYSIS OF THE DECOMPOSITION OF SODIUM BICARBONATE, TRONA, AND WEGSCHEIDER'S SALT, by Edward M. Barrall, II and L. B. Rogers. Rept. on Contract AT(30-1)905. 27 Sep 61, 21p. 15 refs.

AD-280 480 OTS $1.10

Linfield [Research Inst.] McMinnville, Ore.
VAPOR PRESSURE AND HEAT OF VAPORIZATION OF ISO-BUTYLAMINE, by Marvin C. Hines and Carl M. Anderson. [1959] 6p. 3 refs. [AROD rept. no. 755.1].

DESCRIPTORS: *Amines, *Butyl radicals, *Thermodynamics, *Vapor pressure, Vaporization, Measurement.

The vapor pressure of iso-butylamine was measured over the range of 18° to 50°C. The Antoine equation $\log_{10} P = 6.5658 - 957.21/(t + 192.10)$ was derived to describe the vapor-pressure-temperature curve. The heat of vaporization of iso-butylamine was calculated to be 106.5 calories per gram at the normal boiling point, 67.7°C., and 112.98 calories per gram at 25°C. (Author)

NASA N63-12354 OTS $3.60

Theoretical Chemistry Inst., U. of Wisconsin, Madison.
KINETIC THEORY OF NON-SPHERICAL MOLECULES, V, by C. F. Curtiss and J. S. Dahler (U. of Minnesota). Rept. on Grants NsG-275-62(4180) and NSF G-9204. 19 Nov 62, 32p. 9 refs. WIS-TCI-6, series 2.

EARTH SCIENCES

SCTM-170-62(25) OTS $2.60

Sandia Corp., Albuquerque, N. Mex.
SEISMIC NOISE STUDY AT LOS ALAMOS SCIENTIFIC LABORATORY, by G. J. Hof. Rept. on Contract AT(29-1)789.

Climatology and Meteorology

PB 162 729 OTS $2.60

American Power Jet Co., Ridgefield, N. J.
AIRCRAFT OPERATION IN ICING WEATHER, by Robert W. Jailer and James M. Ciccotti. Rept. on Contract AF 33(616)2605. June 55, 26p. 36 refs. WADC Technical note 55-226; AD-80 238.

DESCRIPTORS: *Airplanes, *Flight paths, Ice, *Meteorological parimeters, Clouds, Ice prevention.

Various weather situations in which icing is likely to be encountered are discussed from the point of view of the location of the icing within them. General rules found in the literature for the choice of flight paths through such areas are presented; limitations in their applicability are pointed out. A brief discussion of certain aspects of the physical operation of aircraft in icing is presented, with emphasis placed on the matter of penetration speeds. (Author)

TID-17378 OTS $9.10

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
AN INVESTIGATION OF FACTORS IMPORTANT IN THE DESIGN OF A THERMAL PRECIPITATOR FOR USE AT HIGH ALTITUDE, by Thomas W. Wilson and Clyde Orr, Jr. Final rept. 15 May 59-15 May 62, on Contract AT(40-1)2568. 10 Dec 62, 105p. 22 refs.

NASA N63-12125 OTS $1.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
THE NIMBUS SPACECRAFT AND ITS COMMUNICATION SYSTEM AS OF SEPTEMBER 1961, by Rudolf A. Stampfl. Jan 63, 53p. 10 refs. Technical note D-1422.

HW-SA-2751 OTS $1.60

Hanford Atomic Products Operation, Richland, Wash.
PRECIPITATION SCAVENGING AND SPECTRAL APPLICATIONS OF THE HANFORD RAINDROP SAMPLERS, by R. J. Engelmann. Rept. on Contract AT(45-1)1350. 2 Nov 62, 20p. 13 refs.

UCRL-6706 $2.60

Lawrence Radiation Lab., U. of California, Livermore.
A NOTE ON DIAGNOSTIC USES FOR ISOBARIC AND ISOPYCNIC BALLOONS IN METEROLOGY, by Joseph B. Knox. Rept. on Contract W7405-eng-48. 1 Dec 61, 22p. 9 refs.

NASA N63-12003 OTS $3.00

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
MONTHLY AND ANNUAL WIND DISTRIBUTIONS AS A FUNCTION OF ALTITUDE FOR SANTA MONICA, CALIFORNIA (PACIFIC MISSILE RANGE) by J. W. Smith. Jan 63, 157p. 16 refs. Technical note D-1569.

Geology

Order from GPO $1.00 as
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Geological Survey, Washington, D. C.
ANNOTATED BIBLIOGRAPHY ON HYDROLOGY AND SEDIMENTATION UNITED STATES AND CANADA 1955-58, by H. C. Riggs. 1962, 239p. Geological Survey Water-Supply paper 1546.

DESCRIPTORS: *Bibliography, Abstracts, *Hydrology, *Sedimentation, Water supplies, Geological survey, *Geology, North America.

Order from GPO $0.15 as
I 19.3:1141-I

Geological Survey, Washington, D. C.
CHARACTER AND HISTORY OF THE UPPER OHIO RIVER VALLEY. CONTRIBUTIONS TO GENERAL GEOLOGY, by Charles W. Carlston. 1962, 10p. 7 refs. Geological Survey bulletin 1141-I.

DESCRIPTORS: *Geology, Geological survey, *Rivers, Deltas, Sedimentation.

Dismemberment of the preglacial Teays Valley system and development of the present Ohio River valley began in late Teritiary or early Pleistocene. By Illinoian time the present Ohio River was largely established in its present course, except for its headwaters above mile 114, which still flowed northward. The Illinoian glacial advance into northwestern Pennsylvania caused diversion of this deepened and broadened during the Sangamon interglacial stage, and was filled with fluvioglacial deposits during the Tazewell and Cary ice advances into northwestern Pennsylvania. Post-Cary activity of the river has included downgrading and the cutting of terraces, which are floored with flood-plain deposits.

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Geological Survey, Washington, D. C.
GEOMORPHOLOGY AND GENERAL SYSTEMS THEORY. THEORETICAL PAPERS IN THE HYDROLOGIC AND GEOMORPHIC SCIENCES, by Richard J. Chorley. 1962, 10p. 48 refs. Geological Survey Professional paper 500-B.

DESCRIPTORS: Geology, *Hydrology, Theory, Geography.

Order from GPO $1.50 as
I 19.16:450-D

Geological Survey, Washington, D. C.
SHORT PAPERS IN GEOLOGY, HYDROLOGY, AND TOPOGRAPHY ARTICLES 120-179. GEOLOGICAL SURVEY RESEARCH 1962. 1962, 98p. Geological Professional paper 450.

DESCRIPTORS: Literature, *Geology, Economic geology, Stratigraphy, Geophysics, Minerals, Geochemistry, Petrology, Glaciers, Paleoecology, Sedimentation, Mapping, *Terrain, *Hydrology, Water, Drainage, Water supplies, Solvent action, Cleaning compounds, Surface tension.

Scientific notes and summaries of investigations prepared by members of the Geologic, Water Resources, and Topographic Divisions in the fields of geology, hydrology, topography, and related sciences.

Order from GPO $0.25 as
I 19.3:1141-A

Geological Survey, Washington, D. C.
ULTRASONIC MEASUREMENT OF SUSPENDED SEDIMENT. CONTRIBUTIONS TO GENERAL GEOLOGY, by Gordon H. Flammer. 1962, 52p. 22 refs. Geological Survey bulletin 1141-A.

DESCRIPTORS: *Geology, *Sedimentation, Motion, Particle size, Measurement, *Ultrasonic radiation.

TEI-788 $1.50

Geological Survey, Washington, D. C.
WATER WELLS IN FRENCHMAN AND YUCCA VALLEYS, NEVADA TEST SITE, NYE COUNTY NEVADA, by J. W. Hood. July 61, 61p. 9 refs.

TID-17253 OTS $3.60

Princeton U., N. J.
THE COPRECIPITATION OF Sr^{+2} WITH ARAGONITE AND OF Ca^{+2} WITH STRONTIANITE BETWEEN 90° AND 100° C, by H. D. Holland, M. Borcsik and others. Technical rept. no. 2, on Contract AT(30-1)2266 [1962] 39p. 16 refs.

Physics of the Atmosphere

WT-547 OTS $6.60

[Army Electronics Research and Development Lab.] Fort Monmouth, N. J.
EFFECTS OF ATOMIC EXPLOSIONS ON THE IONOSPHERE, by Fred B. Daniels and Arthur K. Harris. Operation Snapper. Jan 53, declassified 23 Jan 62. 63p. 14 refs.

NASA N63-12586 OTS $2.25

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
THE ATMOSPHERE AS A PART OF THE SPACE ENVIRONMENT, by Richard A. Hord, Wilber B. Huston, and Harold B. Tolefson. Jan 63, 100p. 126 refs. Technical note D-1387.

AD-277 749 OTS $26.00

Stanford Electronics Labs., Stanford U., Calif.
BIBLIOGRAPHY OF THE IONOSPHERE. AN ANNOTATED SURVEY THROUGH 1960, by Laurence A. Manning. Final rept. on Contract AF 19(604)6194. May 62, 624p. 4,000 refs. Rept. no. SEL-62-064; AFCRL-62-188.

DESCRIPTORS: *Bibliography, *Ionosphere, *Aurorae, *Absorption, *Meteors, Ionospheric propagation, Solar eclipses, Atmosphere, Density, Conductivity, Diffusion, Attenuation, Ions, Magnetic storms, Noise, Nuclear explosions, Polarization, Satellites, Scattering, Solar flares, Ionospheric disturbances, Tides, Wind, Temperature, Weather forecasting, Upper atmosphere, Radio waves.

ENGINEERING

PB 162 763 OTS $13.50

Battelle Memorial Inst., Columbus, Ohio.
A FEASIBILITY STUDY OF TECHNIQUES FOR MEASURING AND PREDICTING THE STATE OF THE ART, by F. L. Bagby, D. L. Farrar and others. Rept. on Contract AF 18(600)1655. July 59, 196p. 360 refs. ARDC-TR-59-78; AD-233 350.

DESCRIPTORS: *Operations research, Bibliography, Air force research, Human engineering, Reliability, Triangular wings, Aerodynamics, High temperature research, Metallurgy, Reviews, Feasibility studies

The scope of the study was limited in that science and technology were considered only in the strictest engineering sense; techniques such as systems engineering, reliability engineering, and operations analysis were treated briefly from the viewpoint that accurate state-of-the-art information is required for their effective use. The method of approach relies on the use of case histories of the development of the delta wing's aerodynamics and high-temperature metallurgy as examples for analysis. The specific examples were supported by a general study of the research and development process and a study of the gross economic inputs into research and development in the United States. Conclusions show that techniques for the measurement of state of the art exist and have long been used.

PB 162 777 OTS $6.60

Motorola, Inc., Riverside, Calif.
FIELD SUPPORTED ROTORS, by R. H. Hertel. Rept. on Fundamental Sensor Study, Subcontract to Contract Nonr-167000. Dec 60, 63p. 6 refs. Technical rept. no. RL-TR-3846-2; AD-248 279.

DESCRIPTORS: *Gyroscopes, Magnetic fields, Electro static fields, *Torque, *Inertial guidance, Rotating structures, Design.

Approximate solutions for the forces and torques acting on the oblate spheroidal rotor of an electrostatic or cryogenic gyro can be obtained by expressing the rotor surface in terms of a small parameter d describing its departure from sphericity. Expressions for the force and torque correct to zero and first order in d, respectively are derived for generally electrostatic and axially-symmetric magnetostatic support fields. The results indicate that the first-order torque can be made to vanish for all orientations of the rotor with respect to the support field and for any support force if the support field can be dynamically constrained to satisfy at most eight simultaneous equations. Some expressions are derived for the precision of control of the design parameters as a function of the required gyroscopic performance. (Author)

PB 181 472 OTS $1.75

Water Research Foundation of Australia, Sydney.
DESALINATION: A REPORT ON A STUDY TOUR OF THE USA, by C. J. Wiesner. Nov 61, 66p. 15 refs. Rept. no. 3.

DESCRIPTORS: *Sea water, Water, *Hydrology, *Desalination, *Reviews, Water supplies, Australia, Economics, Purification, Distillation, Electrodialysis, Energy, Energy management.

Contents:
List of organisation and individuals interviewed
The general economics of desalination
Degree of purification required
Potential demand for de-salinators
Classification of methods of de-salination
Distillation methods using thermal energy
Processes using mechanical energy
Processes using electrical energy
Use of chemical energy

Aeronautical Engineering

NASA N63-12247 OTS $1.25

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
HANDLING QUALITIES AND OPERATIONAL PROBLEMS OF A LARGE FOUR-PROPELLER STOL TRANSPORT AIRPLANE, by Hervey C. Quigley and Robert C. Innis. Jan 63, 48p. 12 refs. Technical note D-1647.

AD-295 464 repriced OTS $2.75

Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
STUDY OF A SONIC LOAD RECORDER, by Jay H. Ball, Norman Doelling and others. Rept. for Jan-Dec 61 on Dynamic Problems in Flight Vehicles, Contract AF 33(616)7789. Nov 62, 133p. 15 refs. BBN rept. 902; ASD TDR-62-165, vol. I.

DESCRIPTORS: *Acoustics, *Recording systems, *Noise analyzers, Design, Circuits, *Jet engine noise, Rocket motor noise, Airplane panels, *Sonic fatigue, *Fatigue (Mechanics)

The feasibility of a compact instrument to measure the accumulated acoustic exposure of a flight vehicle is considered. The output data of the instrument will aid the estimation of fatigue life. A study of the conditions and parameters involved together with general requirements of the instrument is presented. Design criteria are discussed such as techniques for amplitude analysis, sampling and accumulation of data in a directly readable and usable form. A specific design of a breadboard model of the sonic recorder is given with test and performance data under laboratory conditions. A discussion of the effects of temperature, vibration, and power supply variations is also included. Complete circuit diagrams are provided.

NASA N63-12563 OTS $5.60

Flight Research Center, National Aeronautics and Space Administration, Edwards, Calif.
LANDING-GEAR BEHAVIOR DURING TOUCHDOWN AND RUNOUT FOR 17 LANDINGS OF THE X-15 RESEARCH AIRPLANE, by James M. McKay and Betty J. Scott. Mar 61, declassified 1 Dec 62. 54p. 7 refs. Technical memo. X-518.

NASA N63-12564 OTS $1.60

Flight Research Center, National Aeronautics and Space Administration, Edwards, Calif.
LANDING LOADS AND DYNAMICS OF THE X-15 AIRPLANE, by James M. McKay and Eldon E. Kordes. Mar 62, declassified 1 Dec 62. 17p. 1 ref. Technical memo. X-639.

NASA N63-12192 OTS $0.75

Flight Research Center, National Aeronautics and Space Administration, Edwards, Calif.
SOME OPERATIONAL ASPECTS OF USING A HIGH-PERFORMANCE AIRPLANE AS A FIRST-STAGE BOOSTER FOR AIR-LAUNCHING SOLID-FUEL SOUNDING ROCKETS, by Victor W. Horton and Wesley E. Messing. Jan 63, 23p. 3 refs. Technical note D-1279.

NASA N63-12004 OTS $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EXPERIMENTAL PANEL FLUTTER RESULTS FOR SOME FLAT AND CURVED TITANIUM SKIN PANELS AT SUPERSONIC SPEEDS, by John G. Presnell, Jr. and R. L. McKinney. Jan 63, 17p. 2 refs. Technical note D-1600.

NASA N63-12500 OTS $1.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
FLUTTER TESTS OF SANDWICH-TYPE FLAT PANELS AT MACH NUMBERS OF 2.97 AND 4.12, by Eldon E. Kordes and Ernest W. Evans. Dec 58, declassified 1 Dec 62. 17p. 2 refs. NASA MEMO-10-17-58L.

NASA N63-12243 OTS $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
SPIN INVESTIGATION OF A 1/20-SCALE MODEL OF AN UNSWEPT-WING, TWIN-ENGINE, OBSERVATION AIRPLANE, by Henry A. Lee. Jan 63, 19p. 4 refs. Technical note D-1516.

NASA N63-12497 OTS $9.10

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
TABULATED DATA FROM A PRESSURE-DISTRIBUTION INVESTIGATION AT MACH NUMBER 2.01 OF A 45° SWEPTBACK-WING AIRPLANE MODEL AT COMBINED ANGLES OF ATTACK AND SIDESLIP, by John P. Gapcynski and Emma Jean Landrum. Nov. 58, declassified 1 Dec 62. 104p. 1 ref. NASA Memo-10-15 Memo-10-15-58L.

AD-288 572 OTS $2.00

Minnesota U., Minneapolis.
STABILITY AND DRAG OF PARACHUTES WITH VARYING EFFECTIVE POROSITY, by Helmut G. Heinrich and Eugene L. Haak. Final rept. on Contract AF 33(616)8310. Sep 62, 97p. 8 refs. ASD TDR-62-100.

DESCRIPTORS: *Parachutes, *Drag, Aerodynamics, Porosity, Parachute fabrics, Model tests, Windtunnel models, Aerodynamic data, *Stability, Textiles.

The tangent force, normal force, and moment coefficients versus angle of attack of ten different types of parachutes have been determined by wind tunnel measurements. Models were made from rigid metal and from cloth with porosity varying from 0 to 275 ft^3/ft^2-min, and the porosity is used as a parameter in the presentation of all results. It was found that the static stability of all types of parachutes can be significantly improved through higher porosity, with a resulting slight decrease of drag.

Electrical and Electronic Engineering

AD-264 653 OTS $3.60

Army [Electronics] Research and Development Lab., Fort Monmouth, N. J.
PULSED NUCLEAR RADIATION EFFECTS ON ELECTRONIC PARTS AND MATERIALS, by H. J. Degenhart and W. Schlosser. May 61, 37p. 11 refs. USASRDL Technical rept. 2200.

DESCRIPTORS: Electronic equipment, *Coaxial cables, *Resistors, *Thermistors, *Rectifiers, *Capacitors, *Ceramic capacitors, *Tantalum capacitors, *Ferrite cores, Materials, Nuclear energy, *Radiation effects, Semiconductors, Silicon, Selenium, Gamma rays, Electrons, Neutrons, Test equipment, Particle accelerators, Pulse generators, Research reactors.

Nuclear radiation induced transient changes in the electrical characteristics of electronic parts and materials obtained in recent experiments at various pulse reactors are described and discussed. The electronic parts investigated and monitored during exposure include: coaxial cables; resistors, various types and manufacture, ranging in value from 100 ohm to 1 megohm, thermistors, capacitors, ceramic and tantalum; rectifiers, silicon and selenium: and magnetic cores, ferrite. Most of the parts during exposure show transient parameter changes which exceed the tolerance values and then recover generally to the nominal value some time after completion of the radiation pulse. This behavior is of serious concern in data and information processing equipment and in high-frequency and high-accuracy instrumentation that are exposed to such a nuclear environment, yet must maintain their operational tolerance even for short periods of time. (Author)

PB 162 843 OTS $3.60

Battelle Memorial Inst., Columbus, Ohio.
PREPARATION OF PLATES FOR NICKEL-CADMIUM BATTERIES, by W. G. Hespenheide, J. P. Spenard and others. Quarterly rept. no. 1, 1 July-1 Oct 54, on Contract DA 36-039-sc-64415. 1 Oct 54, 33p. 6 refs. AD-65 123.

DESCRIPTORS: *Batteries and components, *Alkaline batteries, *Cadmium alloys, *Nickel alloys, Electrodes, Preparation, Electrodeposition.

An encouraging step toward the objective of producing negative plates for the nickel-cadmium battery was the successful electrodeposition of nickel-cadmium alloys containing any desired composition from 5 to 95 per cent nickel. Alloy deposits containing more than 70 to 80 per cent nickel were coherent and smooth as obtained from acid fluoborate and acid sulfate baths. Licorice,

added to the fluoborate bath, permitted the deposition of satisfactory plate containing 50 per cent nickel. Any deposits which contained less nickel were powdery and noncoherent under the conditions so far investigated. Similar deposits with a porous structure will be produced and evaluated as negative plates for the nickel-cadmium battery. Nickel containing occluded oxide was electrodeposited. Evaluation has not been completed regarding the suitability of the deposits for positive plates. (Author's abstract)

PB 162 844 OTS $3.60

Battelle Memorial Inst., Columbus, Ohio.
PREPARATION OF PLATES FOR NICKEL-CADMIUM BATTERIES, by W. G. Hespenheide, J. P. Spenard and others. Quarterly rept. no. 2, 1 Oct 54-1 Jan 55, on Contract DA 36-039-sc-64415. 3 Jan 55, 36p. 3 refs. AD-65 124.

DESCRIPTORS: *Batteries and components, *Alkaline batteries, *Cadmium alloys, *Nickel alloys, Electrodes, Preparation, Electrodeposition, Gelatin.

The plating of nickel-cadmium alloy from a fluoborate bath containing gum arabic has been perfected to the point where sound, coherent electrodeposits containing 35 per cent nickel and higher are readily obtained. Attempts to produce microporous nickel-cadmium alloy plates from fluoborate, sulfate, or sulfate-chloride baths have been unsuccessful. Prospects are still good for plating the porous alloy. Discharge tests of nickel-cadmium alloy electrodeposits indicate that up to 10 per cent of the theoretical capacity may be realized from 0.7 mil-thick plate, and about 1 per cent from 4-mil-thick plate. The current nonporous alloy plate has the necessary strength, coherence, and adherence to basis metal to be repeatedly flexed without flaking or peeling. It does not appear to deteriorate with cycling. Cadmium and gelatin additions to the bath producing porous nickel permit the deposition of alloy plate of a composition and porosity which has not yet been determined. (See also PB 162 843)

PB 162 845 OTS $2.60

Battelle Memorial Inst., Columbus, Ohio.
PREPARATION OF PLATES FOR NICKEL-CADMIUM BATTERIES, by J. P. Spenard, P. L. Konecny and others. Quarterly rept. no. 3, 1 jan-1 Apr 55, on Contract DA 36-039-sc-64415. 4 Apr 55, 25p. AD-66 764.

DESCRIPTORS: *Batteries and components, *Alkaline batteries, *Cadmium alloys, *Nickel alloys, Silver alloys, Electrodes, Preparation, Electrodeposition, Electrolytes, Sulfates, Chlorides, Iodides, Gelatin.

A porous-Ni-plating bath is being adapted to the deposition of porous Ni-Cd alloy plate. The $CdSO_4$ and gelatin concentrations were varied from 0 to 11 g/l and from 0 to 30 g/l, respectively. Variations of the gelatin content of the bath enabled the electrodeposition of some plates containing as high as 22% Cd but with porosities less than 10%, and others with porosities as high as 33% but with 4.8 to 12% Cd contents. A 4% Cd anode having 15% porosity delivered 60% of its available capacity before polarizing over 0.1 v at a 15-ma/sq in. current density. The anode delivered 21% of its capacity within the same voltage range at a current density of 80 ma/sq inch. Two methods were employed to measure porosity. One method, which involved the impregnation of the electrodeposits with water, was inaccurate for thin rough plates since it measured surface irregularities as pores. The other method consisted of estimating porosity by microscopic examination of plate cross section. (ASTIA abstract) (See also PB 162 844)

PB 162 846 OTS $5.60

Battelle Memorial Inst., Columbus, Ohio.
PREPARATION OF PLATES FOR NICKEL-CADMIUM BATTERIES, by J. P. Spenard, P. L. Konecny and others. Final rept. 1 July 54-1 July 55, on Contract DA 36-039-sc-64415. 1 July 55, 57p. 4 refs. AD-68 690.

DESCRIPTORS: *Batteries and components, *Alkaline batteries, *Cadmium alloys, *Nickel alloys, Electrodes, Electrodeposition, Graphite.

Three techniques were evaluated to determine a suitable process for making plates for the Ni-Cd battery: (1) electroformation of negative plates by electrodeposition of porous Ni-Cd alloy, (2) electroformation of positive plates by electrolytic codeposition of Ni and NiO, and (3) electroformation of negative plates by electrolytic reduction of compacts of NiO and CdO to porous metallic structures. Electroformed anodes were obtained from chloride-sulfate baths containing colloidal graphite to induce porosity and organic additives to refine grain structure and to prevent nodule formation. Electrolytically reducing an $AgCl$-$CdCl_2$ casting in alkaline solution produced a 60-40 Ag-Cd anode of 70% porosity with a theoretical volume capacity of 275 amp-min/cu in.; 6% of this capacity was delivered at a 91-ma/sq in. current density before the anode polarized 0.1 v. At the same current density, 60% of the theoretical capacity was delivered within 0.3 v. The anode gradually lost capacity and strength when cycled a few times, indicating that the Ni grains were not adequately cemented together. A 70% porous anode formed by reducing a compact of NiO and CdO in fused NaOH-KOH did not have good mechanical strength. Colloidal graphite did not induce porosity in the Cd plate taken from either acid or cyanide baths. (See also PB 162 844)

PB 181 120-Rev. OTS $3.50

Bureau of Yards and Docks, Washington, D. C.
ELECTRICAL ELECTRONIC HANDBOOK. Engineered Performance Standards, Public Works Maintenance. Rev. Feb 63, 219p. NAVDOCKS P-703.0.

DESCRIPTORS: *Handbooks, Electrical engineering, *Electrical equipment, *Electronic equipment, Electric cable, Clocks, Protective coverings, Lighting systems, Panel boards (Electricity), Switches, Electric wire, Junction boxes, Transmission lines, Communication equipment, Operations research, *Job analysis, Standards.

PB 162 599 OTS $4.60

Columbia Radiation Lab., New York.
RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM, by P. Kusch. Quarterly progress rept. no. 8, 16 Sep-15 Dec 59, on Contracts DA 36-039-sc-73279, DA 36-039-sc-78330, and AF 49(638)557. 15 Dec 59, 45p. 2 refs. Rept. no. CU-8-59 SC-73279.

DESCRIPTORS: *Magnetrons, *Microwave spectroscopy, Cerenkov radiation, Microwave equipment, *Molecular beams, Tritium, Atoms, Fluorine, Oxygen, Radioactive isotopes, Atomic structure, Hyperfine structure, Helium, Ions, Electromagnetic waves, Microwave amplifiers, *Masers, Design, Physics.

A large fraction of the work currently being carried on and described in the report deals with various kinds of maser devices and with experimentation designed to give basic data of relevance to maser operation. Some results obtained in radio astronomic application of a 3 cm maser amplifier are discussed. Progress in the design and construction of masers at 21 cm and 3 kMc are discussed. Studies of various crystalline materials of potential interest in maser applications are reported. Finally continued effort in the design of optical masers is described. Spectroscopic studies by microwave absorption methods and by the use of maser techniques are described. Experiments on hyperfine structure by the atomic beam method are reported; that on the odd isotopes of xenon has been completed. (Author) (See also PB 159 920)

NASA N63-12358 OTS $2.60

Connecticut U., Storrs.
SENSITIVITY IN SAMPLED-DATA SYSTEMS, by D. P. Lindorff. Rept. on Grant NsG-309-63. [1962] 26p. 4 refs.

PB 162 730 OTS $1.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
RESEARCH STUDIES ON PROBLEMS RELATED TO ECM ANTENNAS. Quarterly engineering rept. no. 1, 1 Sep-1 Dec 58, on Contract AF 33(616)6079. 30 Jan 59, 18p. AD-211 221.

DESCRIPTORS: *Antennas, Spiral antennas, Broadband, Antenna radiation patterns, Impedance, Electromagnetism, Printed circuits, Waveguides, Radar antijamming, Radio antijamming, Countermeasures, Design.

Digital computer programs are being prepared for the calculation of special functions necessary in spiral antenna computations. Impedance and pattern measurements were made for multiple terminal logarithmically periodic antennas of up to seven elements. The impedance and radiation patterns of spheroids of size relatively large compared to the wavelength are being computed as a guide to satellite antenna design. The investigation of numerical calculation of eigenvalues for cylindrical waveguides of arbitrary cross section was terminated. A report on the solution of Wiener-Hopf integral equations of finite range was completed. Design is complete and construction has begun of the new pattern range receiver. Computations of the field diffracted by a group of plane strips is continuing in an effort to evaluate a zoned microwave reflector. An approximate theory for the effect of dielectrics in the near field of a line source agrees quite well with measurements for thin slabs. Multiple element conical spirals are being investigated as a method of obtaining versatility in pattern and impedance of circularly-polarized broadband antennas. (Author)

PB 162 815 OTS $3.60

Electron Tube Research Lab., U. of Minnesota, Minneapolis.
DIFFUSION AND INTERFACE STUDIES ON CATHODE SLEEVE NICKEL, by W. G. Shepherd. Quarterly rept. no. 1, 9 Jan-9 Apr 53, on Contract NObsr-63172. [1953] 34p. 1 ref.

DESCRIPTORS: *Cathodes, Design, Production, *Nickel alloys, Diffusion, Annealing, Analysis, Impurities, Reduction, Reaction kinetics, Thermionic emission.

A discussion is given of a number of phases of the problem of making interface and diffusion studies on cathode nickel. The nature of the overall problem is discussed followed by a description of the conditions dictating the choice of nickel and activators. An outline is given of the method of construction of diffusion couples, a description is given of the diffusion anneal and some of the precautions necessary, sectioning of the couples, methods of analysis of samples and the evaluation of the data are discussed. A discussion is given of factors influencing reactions between the coating and the constituents of the base nickel and a method proposed for determining these rates. The formation and influence of an interface layer on cathode processes is considered It is suggested that the means used for studying reaction rates can also serve to determine the concentration of excess metal required in the oxided coating for optimum emission. (Author)

PB 162 828 OTS $7.60

Electron Tube Research Lab., U. of Minnesota, Minneapolis.
DIFFUSION AND INTERFACE STUDIES ON CATHODE SLEEVE NICKEL, by W. G. Shepherd. Quarterly rept. no. 14, 1 Apr-1 July 56, on Contract NObsr-63172. [1956] 76p. 2 refs.

DESCRIPTORS: *Cathodes, *Oxide cathodes, Design, *Nickel alloys, Diffusion, *Strontium compounds, Oxides, Coatings, Electrodeposition, *Thermionic emission, Carbon alloys, Titanium alloys, Magnesium alloys, Aluminum alloys, Electrodes, Poisoning.

Carbon may react with an oxide coating to liberate alkaline earth metal in accordance with the relation $SrO + C \rightarrow Sr + CO$. Further life studies at zero current drain for oxide cathodes based on a 1% Ti-Ni alloy and operating at 1119°K show that the pulse emission is stable at a high level for approximately 250 hours after which the pulse emission decreases monotonically with time. Measurements on coatings applied in binder to 0.2% Mg-Ni alloy bases in which the magnesium is present in excess of the saturation solubility of magnesium in nickel show that the pulse emission remains at a uniform level for at least 750 hours of operation at 1119°K with zero current drain. The pulse emission of

electrodeposited coatings based on a 4% Al-Ni alloy, operating at 1119°K and with zero current drain, exhibit a broad maximum at approximately 100 hours operation after which the pulse emission gradually declines over a period of 1100 hours. Studies of the effect of a continuous current drain on the activation of cathode coatings based on high purity nickel have been extended to periods of 600 hours of operation at 1119°K. The interface resistances which develop for electrodeposited coatings based on single additive nickels appear to be consistent, with the results previously obtained for conventionally applied coatings on corresponding nickels. Results have been obtained which indicate the possibility that the use of titanium as an anode material may eliminate anode poisoning. (See also PB 162 815)

PB 162 829 OTS $8.10

Electron Tube Research Lab., U. of Minnesota, Minneapolis.
DIFFUSION AND INTERFACE STUDIES ON CATHODE SLEEVE NICKEL, by W. G. Shepherd. Quarterly rept. no. 15, 1 July-1 Oct 56, on Contract NObsr-63172. [1956] 84p. 7 refs. AD-140 939.

DESCRIPTORS: *Cathodes, *Oxide cathodes, Design, *Nickel alloys, Diffusion, *Strontium compounds, Nickel compounds, Oxides, Coatings, Electrodeposition, *Thermionic emission, Carbon alloys, Titanium alloys, Magnesium alloys, Electrodes, Poisoning, Pyrometers, Calibration.

Further attempts to determine the cause of two anomalous features of the Sr evolution from cathodes based on carbon-nickel are described. An analysis of the rate of reduction of an oxide cathode is presented for a situation in which the reaction is initially reaction rate-limited, after which it becomes diffusion-limited. The thermionic performance of cathodes based on 0.2% and 1% Ti-Ni and on 0.2% Mg-Ni alloys has been consistently promising, the emission remaining above 5 amps/cm^2 for periods greater than 1000 hours. Measurements of the cathode deactivation which results from electron bombardment of an anode are reported. Results of a temperature calibration of the test diode structure employed in these studies are reported. (See also PB 162 828)

PB 162 830 OTS $8.10

Electron Tube Research Lab., U. of Minnesota, Minneapolis.
DIFFUSION AND INTERFACE STUDIES ON CATHODE SLEEVE NICKEL, by W. G. Shepherd. Quarterly rept. no. 16, 1 Oct 56-1 Jan 57, on Contract NObsr-63172. [1957] 8[p. 6 refs. AD-140 940.

DESCRIPTORS: *Cathodes, *Oxide cathodes, Design, *Nickel alloys, Diffusion, *Strontium compounds, Barium compounds, Oxides, Carbonates, Coatings, Electrodeposition, *Thermionic emission, Carbon alloys, Titanium alloys, Magnesium alloys.

An analysis of the factors limiting the pulse emission of oxide cathodes is presented. Experimental data for the same cathode and different diode spacings show that the measured emission is an increasing function of diode spacing. A new technique for the reproducible application of uniform (BaSr)CO_3 coatings is described. Further measurements of Sr evolution and thermionic activity of (BaSr)O coatings on Ti-Ni bases in various concentrations are reported. Measurements of the thermionic activity of oxide cathodes based on 0.2% Mg-Ni indicate that high and stable emission can be maintained for periods up to 2000 hours for an operating temperature of 1119°K. Further studies on the influence of electrolytic activation of oxide cathodes are reported, which show that a definite enhancement of the available pulsed emission of an oxide cathode results from a continuous current drain through the cathode. Further studies of the process of electrodeposition of (BaSr)CO_3 from an acetate bath are reported. (See also PB 162 829)

PB 162 831 OTS $7.60

Electron Tube Research Lab., U. of Minnesota, Minneapolis.
DIFFUSION AND INTERFACE STUDIES ON CATHODE SLEEVE NICKEL, by W. G. Shepherd. Quarterly rept. no. 17, 1 Jan-1 Apr 57, on Contract NObsr-63172. [1957] 76p. 2 refs. AD-141 004.

DESCRIPTORS: *Cathodes, *Oxide cathodes, Design, *Nickel alloys, Diffusion, Production, *Strontium compounds, Barium compounds, Oxides, Carbonates, Coatings, Electrodeposition, *Thermionic emission, Carbon alloys, Titanium alloys, Measuring devices (Electrical and electronic, Oscilloscopes, Electrodes, Poisoning.

Apparatus is described which permits a correction to be made for the influence of the coating resistance on the determination of the saturation emission of an oxide cathode. A technique, which is described in detail, permits a correct determination of the saturation emission as well as a measurement of the coating resistance. A theoretical explanation is presented for the observed behavior of the Sr evolution from oxide coated cathodes based on carbon-nickel diffusion couples. Results are given for the Sr evolution from an oxide coating based on a 4.5% Ti-Ni alloy. A tube structure for studies of electrolytic effects on oxide cathodes is described. A structure is described which permits a study of anode poisoning with various off-anode potential gradients. A technique is discussed which permits a simpler control of the bath parameters during electrodeposition of carbonate coatings from an acetate solution. (See also PB 162 830)

PB 162 832 OTS $8.60

Electron Tube Research Lab., U. of Minnesota, Minneapolis.
DIFFUSION AND INTERFACE STUDIES ON CATHODE SLEEVE NICKEL, by W. G. Shepherd. Quarterly rept. no. 18, 1 Apr-1 July 57, on Contract NObsr-63172. [1957] 98p. 7 refs. AD-156 704.

DESCRIPTORS: *Cathodes, *Oxide cathodes, Design, *Nickel alloys, Diffusion, *Strontium compounds, Barium compounds, Oxides, Carbonates, Coatings, Electrodeposition, *Thermionic emission, Carbon alloys, Titanium alloys, Electrodes, Poisoning.

Measurements of the saturation emission and the coating resistance of an oxide cathode by use of pulse techniques are reported and discussed in detail. A correlation of this measurement technique with the saturation emission as determined by Schottky plots is presented. Measurements of the Sr evolution and pulsed emission

from cathodes on 4.5% Ti-Ni bases and on a Ti-Ni matrix are presented. The development of activity in oxide cathodes on pure Ni bases by electrolytic means is described. Details of the process of electrodeposition of $(BaSr)CO_3$ from an acetate bath are presented. Initial results for the re-evolution of Sr from a deposit laid down on a Ti anode which was subsequently heated at 225°C are presented. The development of electrical leakage of an insulating surface exposed to evaporation products from an oxide cathode based on an active nickel is being studied. (See also PB 162 831)

PB 162 833 OTS $7.60

Electron Tube Research Lab., U. of Minnesota, Minneapolis.
DIFFUSION AND INTERFACE STUDIES ON CATHODE SLEEVE NICKEL, by D. E. Anderson. Final rept. 9 Jan 53-1 Feb 61, on Contract NObsr-63172. [1961] 77p. 19 refs.

DESCRIPTORS: *Cathodes, *Oxide cathodes, Design, Production, *Nickel alloys, Diffusion, *Strontium compounds, Barium compounds, Oxides, Carbonates, Coatings, Electrodeposition, *Thermionic emission, Carbon alloys, Titanium alloys, Aluminum alloys, Manganese alloys, Magnesium alloys, Silicon alloys, Tungsten alloys, Electrodes, Poisoning.

This report summarizes studies performed to enhance the understanding of the processes controlling the properties of the oxide cathode. The diffusion coefficients of Al, Mg, Mn, and W added singly to nickel have been determined and are summarized. By the use of radioactive tracer techniques, it is shown that the strontium evolution from an oxide-coated cathode provides a quantitative measure of the rate of reduction of the coating. The development of a highly resistive interface compound is observed for Si-Ni alloys; The deactivation of oxide-coated cathodes, and subsequent recovery, is described where the deactivation results from the electron bombardment of a contaminated electrode. The activation of a passive-based oxide-coated cathode by electrolysis of the coating is described. A model which accounts for the observed behavior of an oxide-coated cathode in dynamic equilibrium between activating (chemical and electrolytic) processes and deactivating processes is discussed. (See also PB 162 832, and PB 142 464)

PB 162 809 OTS $16.00

Electronics Research Lab., Illinois Inst. of Tech., Chicago.
STUDY OF IF TRANSFORMERS FOR SINGLE SIDEBAND OPERATION, by George I. Cohn, Erwin W. Weber, and Paul C. Yuen. Quarterly progress rept. no. 1, 1 Feb-30 Apr 60, on Contract DA 36-039-sc-78342. [1960] 242p. 12 refs.

DESCRIPTORS: *Intermediate frequency transformers, *Radiofrequency filters, Synthesis, *Sidebands, Electrical networks, Electrical impedance.

Network synthesis can be divided into two major areas. The first of these is the mathematical approximation of a response function in terms of rational functions. The second is the realization of this approximation into a network configuration. This report deals with the methods and problems of the realization process. Emphasis is placed on the realization of lossless networks or lossless networks terminated in a resistance. The form of presentation for each realization technique is as follows: a brief explanation, a numerical example, and a flow chart summarizing the mechanical aspects. The realization methods cover the following general types of impedance and admittance functions: (1) driving point functions of two terminal networks, (2) open circuit and short circuit functions for two terminal pair networks; and (3) overall transfer functions for two terminal pair networks operating into resistive loads.

PB 162 764 OTS $8.10

Electronics Research Lab., Illinois Inst. of Tech., Chicago.
STUDY OF I-F TRANSFORMERS FOR SINGLE SIDEBAND OPERATION, by George I. Cohn, Lester C. Peach and others. Quarterly progress rept. no. 2, 1 May-31 July 60, on Contract DA 36-039-sc-78342. [1960] 84p. 4 refs. AD-245 539.

DESCRIPTORS: *Intermediate frequency transformers, *Radiofrequency filters, Synthesis, Design, Electrical networks, *Low pass filters, *High pass filters, *Band pass filters, Transformations (Mathematics), *Sidebands, Functions.

Five methods of approximation are presented: (a) Butterworth approximation, (b) Equiripple-in-the-passband approximation, (c) Equiripple-in-the-stopband approximation, (d) Elliptic approximation, and (e) Fourier approximation. For the methods in which design curves can conveniently be used, such as the Butterworth and the 2 Equiripple approximations, these are presented. A flow chart is included with each method to summarize and implement numerical computation. Frequency transformations are presented for converting a filter as a low-pass filter synthesis to any other filter type. Precorrection for losses in reactive elements is presented. This allows realization of networks as lossless networks with dissipative effects considered in advance as perturbations. (See also PB 162 809)

PB 162 765 OTS $9.60

Electronics Research Lab., Illinois Inst. of Tech., Chicago.
STUDY OF I-F TRANSFORMERS FOR SINGLE SIDEBAND OPERATION, by George I. Cohn, Lester C. Peach and others. Quarterly progress rept. no. 3, 1 Aug-31 Oct 60, on Contract DA 36-039-sc-78342. [1960] 112p. 15 refs. AD-249 353.

DESCRIPTORS: *Intermediate frequency transformers, *Radiofrequency filters, *Low pass filters, *High pass filters, *Band pass filters, *Sidebands, Synthesis, Design, Magnetostriction transducers, Piezoelectric transducers, *Transducers.

Efforts are concerned with: (1) the application of network synthesis methods to band pass filters and (2) electromechanical filter literature review. Examples of synthesis techniques are illustrated. These examples show how ladder band pass filters with a specific response are designed. The criteria for minimum values of element Q are established (on the basis of resonant and antiresonant circuits of the same Q for the realization of the shape of a given network response. A simple graphical method for the determination of the response of a network is presented. This method is

applied to both the lossless case and the case for which losses are taken into account in the design of the filter. The literature review dealing with electromechanical filters is presented. Summaries are given of the published characteristics of rod, disk-and-wire, and plate-and-wire filters; and of magnetostrictive, piezoelectric, electrostatic, and electromagnetic transducers. (Author) (See also PB 162 764)

PB 162 810 OTS $4.60

Electronics Research Lab., Illinois Inst. of Tech., Chicago.
STUDY OF I.F. TRANSFORMERS FOR SINGLE SIDEBAND OPERATIONS, by George I. Cohn, Erwin W. Weber, and Paul C. Yuen. Quarterly progress rept. no. 4, 1 Nov 60-31 Jan 61, on Contract DA 36-039-sc-78342. [1961] 45p. AD-254028.

DESCRIPTORS: *Radiofrequency filters, Design, *Intermediate frequency transformers, Circuits, *Band pass filters, Synthesis, Tuned circuits, Ceramic materials, Piezoelectric materials, Piezoelectric transducers, *Low pass filters, Ferroelectric materials, *Electronic circuits, Capacitors, *Sidebands, Tests.

Research continued on the evaluation of electromechanical filters and the design and testing of filters using ferroelectric ceramic resonators with coils and capacitors. The extension of electromechanical filters to higher center frequencies is discussed. The major difficulties encountered in an attempt to do this are transducer loss and reduction in size of resonator elements. Several filters with fifth order Tchebyscheff characteristics were designed. The one designed for a three kilocycle bandwidth at a center frequency of 442.5 kc was breadboarded and tested. The resulting network had a 2.8 db insertion loss in the pass band and 4 db below the center frequency response had a bandwidth of 3 kc. The attenuation curve exhibited a non symmetrical shape. (Author) (See also PB 162 765)

PB 162 772 OTS $9.60

Glenco Corp., Metuchen, N. J.
FIXED CERAMIC CAPACITOR, TEMPERATURE COMPENSATING AND HIGH-K, by Norman Rudnick. Quarterly rept. no. 1, 15 May-14 Aug 56, on Contract DA 36-039-sc-72323. [1956] 115p. 5 refs. AD-204 572.

DESCRIPTORS: *Capacitors, *Fixed capacitors, *Ceramic capacitors, *Heat resistant materials, Tests, Failure (Mechanics), Electric currents, Voltage, Electrical corona

Investigations conducted on temperature compensating and high-K fixed ceramic capacitors have demonstrated the wide spread of characteristics among and within the different ceramic materials used. The complexity of the fundamental process has been suggested. There was evidence that the exact cause of failure might vary with the particular conditions. It was considered probable that the very high temperature conditions of 200°C provide useful information about fundamental processes, but that actual performance under field conditions is more related to lower temperature data. It is pointed out that since breakdowns at 125°C on bare plates seem to occur near the edge where field failures have been usually found, it is possible that at this temperature the agents that lead to dielectric failure may be accelerated without changing their basic nature. (ASTIA abstract)

AD-268 691 OTS $3.60

Hughes Research Labs., Malibu, Calif.
DEVELOPMENT OF SOLID-STATE MASER AMPLIFIER AND CLOSED-SYSTEM REFRIGERATOR, by H. Barhydt, F. E. Goodwin and others. Quarterly rept. no. 2, 15 July-14 Oct 61, on Contract DA 36-039-sc-87195. [1961] 31p. 5 refs.

DESCRIPTORS: *Masers, Microwave amplifiers, Solid state physics, *Traveling wave tubes, X band, Design, *Preamplifiers, *Refrigeration systems, *Cooling, Helium, Coolants, *Radar equipment, *Communication equipment, Electron tubes, Amplifiers, Tuning circuits Electronic circuits, Cavity resonators, Mathematical analysis, Transmission lines, Ferrites.

Research was continued on the development of the solid-state maser amplifier and closed system refrigerator. Difficulties were encountered in finding a suitable ferrite for the isolators to be used in the slow-wave structure. Commercially available ferrites exhibited anomalous behavior at temperatures below 77 K. A solution was obtained by the use of a special yttrium iron garnet. Techniques for the design of ruby resonators with input and output coupling irises were improved. An analytical formulation of the basic design relationships for traveling-wave masers consisting of iris-coupled active resonators separated by imperfect isolators was derived. A program of machine computations is required to provide useful numerical design data. A ferrite switch to protect the maser from the leak-through energy of a radar TR device was designed and fabricated. This ferrite switch uses a Faraday rotation effect to couple or decouple orthogonal input and output waveguide ports. (Author)

PB 162 735 OTS $22.25

ITT Kellogg, Chicago, Ill.
ELECTRONIC TELEPHONE CENTRAL OFFICE AN/TTC-14(AC-1), by R. Arseneau, R. Reed and others. Final engineering rept. 26 May 58-30 May 60, on Contract DA 36-039-sc-77988. [1960] 421p. AD-253 048.

DESCRIPTORS: *Telephone communication systems, *Switching circuits, *Military communications, *Multichannel telephone systems, Automatic, Communication equipment, Electronic switches, Semiconductors, Electronic scanners, Design, Panel boards (Electricity), Trigger circuits, Telephone lines, Triggered gates, Circuits, Tests.

Construction, system development and circuit considerations are presented of an electronic automatic switchboard, having a 20 to 60 line capacity (with or without an operator), used in a four-wire telephone

system. The switchboard is divided into main building blocks, and a component and functional level. The switchboard is designed to operate in ambient temperatures of -40 F to 125 F; the design of circuits, to operate reliably within this range, is explained. All switching and signaling functions are performed with semiconductor devices resulting in a compact, low power, easily maintained, portable switchboard. Alternate methods are proposed and discussed. Magnetic logic circuit possibilities and an electronic crosspoint matrix are presented and evaluated with respect to their intrinsic qualities relating to the requirements set forth. Individual circuit evolution from initial concept to a final or rejected status is described, listing also, typical performance characteristics. An engineering test model, incorporating an operator's position, 6 lines and 7 trunks (interconnected through two line links and two trunk links) is presented, and results discussed. The performance characteristics of a complete service test model are included. (Author)

PB 162 839 OTS $7.60

Magnavox Co., Fort Wayne, Ind.
INVESTIGATIONS LEADING TO THE DEVELOPMENT OF AN ALKALINE PRIMARY CELL, by Judson West, Jr. and Ralph F. Koontz. Progress rept. no. 8, 1 July-1 Oct 53, on Contract DA 36-039-sc-15413. [1953] 75p. AD-22 097.

DESCRIPTORS: *Batteries and components, *Alkaline batteries, *Primary batteries, Electrical properties, Anodes, Gels, *Battery separators, Paper, Polyvinyl alcohol, Composite materials.

Several groups of batteries were constructed. The first group consisted of 139 batteries possessing 7 cells each These batteries have standard construction features, and possess unconsolidated cathode separator composites, 0.010 g of liquid 75-10-100 electrolyte per cell, and standard metal-bearing anode-gel construction. Most of the batteries failed shortly after construction because of an inadequate separator system. Separator failure was believed to be caused by one or all of the following: (1) insufficient thickness of the separator, (2) excessive pore size through the separator, and (3) the proximity of the anode metal to the separator. The separator problem was attacked by consolidating the cathode-separator composite and (2) using a material to prevent the metal-bearing anode gel from contracting the separator. The materials used to separate the anode gel from the separator were (1) Benaris paper 0.002 in. thick, (2) clear gel 0.010 in. thick, (3) Synpor coated with polyvinyl alcohol, (4) dynel matt coated with polyvinyl alcohol, and (5) Synpor alone. Preliminary investigations of these materials indicated that all except (4) and (5) warranted further investigation. Several batteries were discharged continuously through a fixed resistance of 334.8 ohms. The data representing these discharges are included in addition to graphical presentation. (ASTIA abstract)

PB 162 834 OTS $5.60

Nickel Cadmium Battery Corp., Easthampton, Mass.
INVESTIGATIONS ON THE IMPROVEMENT IN THE PERFORMANCE CHARACTERISTICS OF THE NICKEL-CADMIUM BATTERY, by Arthur Fleischer. Quarterly progress rept. no. 1, 1 Mar-31 May 54, on Contract DA 36-039-sc-56728, continuation of Contract DA 36-039-sc-42651. June 54, 60p. 19 refs. AD-37 731.

DESCRIPTORS: *Batteries and components, *Alkaline batteries, Electrical properties, *Cadmium, *Nickel, Electrodes, Impregnation, Glycols, Ethylenes, *Battery separators.

Cycling tests were continued on a T1092 cell having a singly impregnated negative capacity-limiting plate with a schedule of 10-amp charging and 37.5-amp discharging. A loss in capacity over 30 c was observed when the cycling schedule was increased from 1 to 6 c/day over a 1-wk period. When the usual cycling schedule was resumed, the capacity was recovered in 2 wk. Forty cells having either positive or negative capacity-limiting plate group were assembled for the study of separators, positive plate behavior, and negative-plate cycle life in the presence of electrolyte-soluble addition agents. The addition of degraded dextrans and oxidized starch to the electrolyte used in negative-plate capacity-limiting cells did not improve the cycling characteristics of the negative plate. Polyethylene glycol may be introduced in appreciable concentrations as a constituent of the negative active material by impregnating plaques in cadmium nitrate solutions containing polyethylene glycols. Impregnation of positive and negative plates was continued. Positive plaques were prepared to study the effects of impurities. The effect of polarizing current density was studied for the positive plates. (ASTIA abstract)

PB 162 835 OTS $8.60

Nickel Cadmium Battery Corp., Easthampton, Mass.
INVESTIGATIONS ON THE IMPROVEMENT IN THE PERFORMANCE CHARACTERISTICS OF THE NICKEL-CADMIUM BATTERY, by Arthur Fleischer. Quarterly progress rept. no. 2, 1 June-31 Aug 54, on Contract DA 36-039-sc-56728. [1954] 92p. 6 refs. AD-65 773

DESCRIPTORS: *Batteries and components. *Alkaline batteries, Electrical properties, *Cadmium, *Nickel, Electrodes, Impregnation, Glycols, Ethylenes, *Battery separators, Impurities, Iron, Palladium.

Cycling tests were continued on Cell T1092 having a singly-impregnated negative plate that was capacity-limiting and standard electrolyte (without additive) using a 2-ampere charging schedule and a 37.5-ampere discharge. From the 267th to the 280th cycles, the capacity remained constant with discharges made on a weekly schedule. Testing of positive-limiting cells T1217-1220, 1246 having positive plates varying in the polarizing current density from 0.14 to 0.71 ampere per square inch was completed at 54 cycles. Tests were made on cells T1236-1245 having various separators for the purpose of studying their behavior. Tests at C°F were included. (See also PB 162 834)

PB 162 836 OTS $6.60

Nickel Cadmium Battery Corp., Easthampton, Mass.
INVESTIGATIONS ON THE IMPROVEMENT IN THE PERFORMANCE CHARACTERISTICS OF THE NICKEL-CADMIUM BATTERY, by Arthur Fleischer. Quarterly progress rept. no. 3, 1 Sep-30 Nov 54, on Contract DA 36-039-sc-56728. [1954] 68p. 13 refs. AD-65 771.

DESCRIPTORS: *Batteries and components, *Alkaline batteries, Electrical properties, *Cadmium, *Nickel, *Battery separators, Plastic films, Nylon, Electrodes, Impregnation, Glycols, Ethylenes, Impurities, Vanadates.

Cycling tests were continued on cell No T1092 having a singly-impregnated negative plate that was capacity-limiting and standard electrolyte without additive using a 2-ampere charging schedule and a 37.5-ampere discharge. Capacity remained constant for the thirteen cycles at weekly intervals covering the 280th to 292nd cycles. Cycling tests on the effect of polyethylene glycol on the negative plate were completed at 47 cycles using a schedule with 2-ampere charging and 37.5-ampere discharging. The favorable effect of polyethylene glycol on the maintenance of capacity is indicated by the tests. Cycling tests on positive-limiting cells assembled with plates washed with deionized water and Easthampton tap water during impregnation were carried out for 62 cycles. The type of wash water appears to have no effect on performance. Cycling tests on a series of positive-limiting cells having plates prepared at polarizing current densities from 0.7 to 0.1 ampere per square inch were carried through 33 cycles. A positive-limiting cell having a positive plate prepared by impregnation in a nickel nitrate solution containing 1 gram of palladium per liter (as nitrate) was tested for 33 cycles, including discharges at 0°F and -40°F. Positive-limiting cells having positive plates prepared by impregnation in nickel nitrate solution were tested for 33 cycles including discharges at 0° and -40°F.

PB 162 837 OTS $7.60

Nickel Cadmium Battery Corp., Easthampton, Mass. INVESTIGATIONS ON THE IMPROVEMENT IN THE PERFORMANCE CHARACTERISTICS OF THE NICKEL-CADMIUM BATTERY, by Arthur Fleischer. Quarterly progress no. 4, 1 Dec 54-28 Feb 55, on Contract DA 36-039-sc-56728. [1955] 74p. 10 refs. AD-66 837.

DESCRIPTORS: *Batteries and components, *Alkaline batteries, Electrical properties, *Cadmium, *Nickel, *Battery separators, Plastic films, Nylon, Asbestos, Electrodes, Impgregnation, Glycols, Ethylenes, Sintering, Impurities, Vanadates.

The favorable effect of an open-circuit stand in the as-discharged state on the capacity of a negative plate was confirmed for a charging rate of 0.03 amp/sq in. (2 amp/plate) and a discharge rate of 0.53 amp/sq in. (Engineering--Electrical, 5 May 63) (over) (37.5 amp/plate). Continuation of cycling tests on positive plates discharged to various final discharge voltages confirmed the behavior at the limited discharge to 1.0 v/cell. Cycling of positive-limiting cells confirmed the small improvement in the capacity of cells with pure nickel hardware instead of annealed nickel-plated hardware. The cycling of positive- and negative-limiting cells which had various nylon-cellophane separators was continued. Examination of various parameters indicated that cellophane undergoes an improvement in performance upon continued cycling. The electrical characteristics of cells caused by separators are not a sufficient criterion for the choice of separators for alkaline batteries. Life and physical tests which cover wet strength in alkaline electrolyte are required. (See also PB 162 836)

PB 162 838 OTS $9.10

Nickel Cadmium Battery Corp., Easthampton, Mass. INVESTIGATIONS ON THE IMPROVEMENT IN THE PERFORMANCE CHARACTERISTICS OF THE NICKEL-CADMIUM BATTERY, by Arthur Fleischer. Quarterly progress rept. no. 5, 1 Mar-31 May 55, on Contract DA 36-039-sc-56728. 27 June 55, 103p. 15 refs. AD-66 836.

DESCRIPTORS: *Batteries and components, *Alkaline batteries, Electrical properties, *Cadmium, *Nickel, Carbonyl radicals, Titanium, *Battery separators, Plastic films, Electrodes, Impregnation, Glycols, Ethylenes, Methylene blue, Impurities, Iron, Copper.

Positive plates were impregnated in nickel nitrate solutions which were prepared from H-grade nickel carbonate and commercial $Ni(NO_3)_2 \cdot 6H_2O$. The nickel carbonate plates showed a better performance, both on formation and at a current density of 0.53 amp/sq inch. The addition of methylene blue (1 g/l) or polyethylene glycol (5 to 20 g/l) to the nickel nitrate solution did not affect the performance of positive plates prepared by impregnation of these solutions. The use of an NH_4NO_3-NH_4OH solution as a dip for cathodically polarized plates eliminated the brushing operation. Sintered gridless Ti plaques impregnated normally for the prosity of about 45%. The formation of negative plates was not affected by the addition of oxidized cellulose at a concentration of 5 g/l to the electrolyte. Studies of separators by determining the performance in positive-limiting cells demonstrated that there are several materials with better electrical characteristics than the barrier type of separators which use cellophane. (See also PB 162 837)

PB 162 840 OTS $9.10

Nickel Cadmium Battery Corp., Easthampton, Mass. INVESTIGATIONS ON THE IMPROVEMENT IN THE PERFORMANCE CHARACTERISTICS OF THE NICKEL-CADMIUM BATTERY, by Arthur Fleischer. Quarterly progress rept. no. 6, 1 June-31 Aug 55, on Contract DA 36-039-sc-56728. [1955] 104p. 12 refs. AD-84 173.

DESCRIPTORS: *Batteries and components, *Alkaline batteries, Electrical properties, *Nickel, *Cadmium, *Battery separators, Electrodes, Impregnation, Sintering, Impurities, Iron, Copper.

The assembly of 1 negative-limiting (N-L) and 31 positive-limiting (P-L) test cells is described. Cycling tests are reported on several N-L cells in the study of the effect of open-circuit stand after discharge. Iron was found in the positive plates of P-L cells after they were cycled 290 times. The electrolytes from cells with pure Ni hardware were Fe free; those from cells with Ni-plated steel hardware showed an Fe content of about 0.2 ± 0.1 mg/l (about 3% of that originally present in the electrolytes). Testing (through 50 cycles) was performed on cells with positive plates containing either Cu or Fe coprecipitated in the active material in amounts equivalent to 0.1, 0.25, and 0.50 at. -% of the Ni content. The capacities decreased with an increase in the Fe content. The effect of Cu was beneficial up to 0.25 at-%, and the formation capacity was not affected by Cu up to

0.5 at-%. Cells (both N-L and P-L) with plates having top and bottom bus bars showed a voltage distribution (which was proportional to the current) from the top to the bottom of the plates. (See also PB 162 828)

PB 162 841 OTS $7.60

Nickel Cadmium Battery Corp., Easthampton, Mass. INVESTIGATIONS ON THE IMPROVEMENT IN THE PERFORMANCE CHARACTERISTICS OF THE NICKEL-CADMIUM BATTERY, by Arthur Fleischer. Quarterly progress rept. no. 7, 1 Sep-30 Nov 55, on Contract DA 36-039-sc-56728. [1955] 76p. 11 refs. AD-84 172.

DESCRIPTORS: *Batteries and components, *Alkaline batteries, Electrical properties, *Nickel, *Cadmium, *Battery separators, Plastic films, Nylon, Paper, Rubber, Electrodes, Impregnation, Glycols, Ethylenes Sintering.

Thirteen P-L test cells with 3-plate elements were assembled, formed, and cycled. Eight of the cells had various nylon separators. The formation capacity was decreased by interlayering with cellophane and by sealing the edges of the multilayered separators. Five cells with electrolyte concentrations varying from 7 to 2 N showed a decrease in formation capacity below 6 N electrolyte; the apparent minimum was at 4 N. The beneficial effect of open-circuit stand was shown by negative plates whose history involved charging rates limited to a current density of 0.043 amp/sq. inch. The favorable effect was confirmed of the oxidized cellulose addition to the electrolyte on formation or cycling. Lowering the electrolyte concentrations resulted in a decrease in the improvement in capacity on cycling (at a charging rate of 0.14 amp/sq in.) and in the positive plate capacity. At least 30 min were required to obtain adequate sintering with 8 solution phase-precipitated Ni powders. (See also PB 162 840)

PB 162 842 OTS $9.60

Nickel Cadmium Battery Corp., Easthampton, Mass. INVESTIGATIONS ON THE IMPROVEMENT IN THE PERFORMANCE CHARACTERISTICS OF THE NICKEL CADMIUM BATTERY, by Arthur Fleischer. Quarterly rept. no. 8 (Final), 1 Dec 55-29 Feb 56, on Contract DA 36-039-sc-56728, 31 Mar 56, 114p. 31 refs. AD-92 016.

DESCRIPTORS: *Batteries and components, *Alkaline batteries, Electrical properties, *Nickel, *Cadmium, Titanium, *Battery separators, Nylon, Electrodes, Impregnation, Glycols, Ethylenes, Sintering, Impurities, Iron.

Positive-limiting cells (29) were tested to study the effect of electrolyte concentration, separators, anion addition to the electrolyte, and various separations between plates. The formation of positive plates in electrolyte stronger than 5 normal (1.20 sp gr) gave the maximum formation capacity. Increase in the open-circuit stand in the as-discharged state for negative-limiting cells on a test schedule of a charge current density of 0.03 ASI (amp/sq in.) and a discharge current density of 0.53 ASI improved the maintenance of capacity of the negative plate on cycling. The addition of boric acid at a concentration of 10 g/l to 30% KOH had no effect on the formation of the positive plate but tended to lower capacity. A mixture of KOH and K_3PO_4 in equivalent quantities as electrolyte decreased the formation capacity of the positive plate to a small extent and the high-rate capacity by about 10%. (See also PB 162 841)

TID-17194 OTS $1.60

Oak Ridge Gaseous Diffusion Plant, Tenn. FLAMMABLE GAS EXPLOSION IN LARGE OIL CIRCUIT BREAKER, by J. R. Johnston. Rept. on Contract W7405-eng-26. 13 Nov 62, 18p. 2 refs.

PB 148 020 OTS $3.60

Stanford Electronics Labs., Stanford U., Calif. A SOLID-STATE LOGARITHMIC VIDEO AMPLIFIER, by G. S. Bahrs and W. D. Hindson. Rept. on Contract DA 36-039-sc-78296. 22 Apr 60, 37p. 5 refs. Technical rept. no. 1604-1; AD-237 234.

DESCRIPTORS: *Video amplifiers, Pulse amplifier, *Diodes, Transistor amplifiers, *Electronic circuits, Silicon, Voltage amplifiers.

This report describes an all-solid-state logarithmic video amplifier which develops an output pulse amplitude proportional to the logarithm of the input pulse amplitude. The resultant compression reduces the ratio of maximum to minimum signal amplitude from 3,000:1 at the input to 10:1 at the output, thus allowing the pulses to be viewed on an oscilloscope or recorded on magnetic tape. Conversion accuracy is such that from observations of the output pulses, the amplitude of any signal within the 70-db input range may be estimated to within 3 db. Several forms of compensation are included in the circuitry to correct for diode nonidealities, and thus significantly to extend the useful dynamic range, reduce risetime, and improve tolerance to ambient temperature variations.

PB 162 755 OTS $14.00

Stanford Research Inst., Menlo Park, Calif. INVESTIGATION OF AN ELECTRICALLY EXCITED AIRFRAME AS AN ANTENNA, by N. E. Keller and F. B. Harris, Jr. Final rept. part I, on Contract AF 33(616)5549. Apr 60, 203p. 22 refs. SRI Proj. 2484; AD-238 808.

DESCRIPTORS: Aircraft, Triangular wings, *Airframes, *Antennas, Airplane antennas, Excitation, Flight testing, High frequency, Antenna couplers, *Antenna radiation patterns, Jet bombers, Impedance, Test methods, Low frequency, Supersonics, Transonics

A comprehensive study of means for exciting electromagnetic radiation from delta-wing aircraft in the frequency range from 2 to 36 Mc is given. Antenna impedances and radiation patterns measured on scale models of the B-58 are presented and discussed. The excitation systems investigated include the fixed wire, leading-edge wing notch, trailing-edge wing notch, tail notch, tail shunt, nose probe, and trailing wire. Similar model measurements of the trailing wire on the B-70 are also described. The performance of the antenna systems studied is compared with that of the tail cap in use on the RB-66. Antenna transfer efficien-

cies are obtained for all systems investigated, and pattern efficiencies are computed. The limitations of this definition of pattern efficiency are discussed, and a modified definition which more nearly corresponds to the true utility of the antenna is developed.

PB 162 756 OTS $16.00

Stanford Research Inst., Menlo Park, Calif.
INVESTIGATION OF AN ELECTRICALLY EXCITED AIRFRAME AS AN ANTENNA: RADIATION PATTERNS, by N. E. Keller and F. B. Harris, Jr. Final rept., part II, on Contract AF 33(616)5549. Apr 60, 245p. SRI Proj. 2484. AD-238 809.

DESCRIPTORS: Aircraft, *Antennas, Airplane antennas, *Antenna radiation patterns, Excitation, Polarization, Jet bombers, Airframes, High frequency

This report supplement contains the radiation patterns for the HF aircraft antennas described in Part I (PB 162 755). All patterns shown are recorded in field intensity normalized with respect to the equivalent isotropic radiator. The B-58 patterns include sets for six different methods of excitation. Those for a single frequency are shown on facing pages. The ones on the left hand page are the principal-plane patterns for ϕ and θ polarization. On the right hand page the patterns indicate intensities for both polarizations taken at θ = 60 degrees and θ = 120 degrees. Principal-plane patterns for θ = 90 degrees are repeated on this page to simplify comparison. The B-70 patterns consist of a single set for the trailing wire antenna. Organization is the same as for the B-58 patterns, except that the conics are for values of θ near the directions most favorable to long-range communication at each frequency. Pattern sets for the trailing wire on each aircraft are given for three different flight conditions. (Author)

AD-294 000 repriced OTS $1.50

Westinghouse Electric Corp., Baltimore, Md.
PHOTOEMISSIVE ENERGY CONVERSION APPLIED RESEARCH PROGRAM, by L. Limansky, E. F. Wood, and A. S. Jensen. Final technical rept. for Dec 61-Nov 62 on Contract AF 33(657)7865. Dec 62, 58p. ASD TDR-62-1021.
DESCRIPTORS: *Energy conversion, *Photoelectric effect, Photoelectric cells (Semiconductor), *Solar cells, Design, Production, Theory, Electrical properties, Tests, Sealing compounds, Electrodes.

Work was performed on the feasibility of making a close-spaced, glass-sandwich photoemissive solar power converter. It was not possible to make operable sealed-off converters due to the difficulty of sealing within a vacuum system and the particular configuration of the device giving a large value of surface-to-volume ratio. The requirement of a low work-function surface for the anode was verified by a test involving changing the interelectrode spacing of a converter in situ within the processing system. Converter action was obtained with a spacing over an inch, but decreased with spacing. This anomalous behavior is explained, and it is noted that at closer spacings the output power increases and the internal resistance decreases. Consideration of the subsequent invention and demonstration of the cadmium sulphide solar power converter at relatively high conversion efficiencies and in a thin, flexible, polycrystalline film form leads to the conclusion that the photoemissive converter is no longer competitive.

PB 162 849 Available on loan from OTS

Dayton U. Research Inst., Ohio.
TRANSDUCERS FOR DATA COLLECTION IN THE NEAR VICINITY OF A NUCLEAR DETONATION, by Gordon W. Mills and George J. Roth. Rept. on Contract AF 33(616)5008. Sep 59, 82p. 11 refs. WADC Technical rept. 59-689.

DESCRIPTORS: *Transducers, Gages, Tests, Nuclear weapons tests, Data, Collecting methods.

The feasibility of taking electrical measurements within the fireball of a nuclear detonation using tape recording techniques has previously been demonstrated. The objective of this program was to generate new electrical transducer ideas and to investigate gages based on these concepts for taking such measurements. This report presents six types of these gages which are termed as follows: translation gage, velocity gage, impulse gage, diaphragm type ablation gage, acceleration and pressure gage, and electrical continuity type ablation gage. Particular consideration has been given to the development and discussion of the translation gage.

NASA N63-10959 OTS $15.50

IBM Federal Systems Div., Rockville, Md.
NASA Project MERCURY: BERMUDA PROCESSOR PROGRAMS, Rept. on Contract NAS5-1376. Rev. 1 May 62, 240p. MC-106

NASA N63-12075 OTS $0.75

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
AN ANALYTIC REPRESENTATION OF MUSEN'S THEORY OF ARTIFICIAL SATELLITES IN TERMS OF THE ORBITAL TRUE LONGITUDE, by Ann E. Bailie and David Fisher. Jan 63, 23p. 4 refs. Technical note D-1468.

NASA N63-12488 OTS $1.00

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
PRELIMINARY REPORT ON THE SINGLE STATION DOPPLER-INTERFEROMETER ROCKET TRACKING TECHNIQUE, by J. Carl Seddon. Jan 63, 33p. 5 refs. Technical note D-1344.

NASA N63-12341 OTS $7.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-18, VOLUME VI. SPACE EXPLORATION PROGRAMS AND SPACE SCIENCES. Rept. for 1 Sep-1 Dec 62 on Contract NAS7-100. 31 Dec 62, 80p. 4 refs.

NASA N63-11986 OTS $2.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
ENVIRONMENTAL PROBLEMS OF SPACE FLIGHT STRUCTURES. II. METEOROID HAZARD, by John R. Davidson and Paul E. Sandorff. Jan 63, 75p. 102 refs. Technical note D-1493.

NASA N63-12246 OTS $1.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
INVESTIGATION OF THE LATERAL VIBRATION CHARACTERISTICS OF A 1/5-SCALE MODEL OF SATURN SA-1, by John S. Mixson, John J. Catherine, and Ali Arman. Jan 63, 66p. 4 refs. Technical note D-1593.

NASA N63-12160 OTS $1.00

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
EFFECT OF SURFACE ENERGY ON THE LIQUID-VAPOR INTERFACE CONFIGURATION DURING WEIGHTLESSNESS, by Donald A. Petrash, Thomas M. Nelson, and Edward W. Otto. Jan 63, 33p. 4 refs. Technical note D-1582.

PB 159 296 OTS $5.60

Massachusetts Inst. of Tech. [Cambridge].
A VARIATIONAL CALCULUS SOLUTION TO THE OPTIMUM ORBITAL ESCAPE PROBLEM, AND A COMPARISON WITH SEVERAL STEERING PROGRAMS OF SIMPLE ANALYTICAL FORM, by Larry A. Baron. Master's thesis. Rept. on Contract AF 49(638)363. 16 Jan 61, rev. 26 June 61, 57p. 8 refs. AFOSR 1008.

DESCRIPTORS: *Orbital flight paths, Orbital trajectories, Satellite vehicles, Space flight, *Calculus of variations, *Satellite vehicle trajectories.

The calculus of variations is used to determine the power level, thrust magnitude, and steering program which will minimize the propellant necessary for a vehicle to effect an escape from an orbit around the Earth. The trajectory is shown to consist of a number of thrusting sub-arcs proportional to the value of the time constraint. If the time constraint is less than one revolution of the initial orbit, the trajectory consists of one thrusting-arc. For a thrust-limited vehicle it is shown on physical grounds that the thrusting-arc consists of maximum thrust. For a power-limited vehicle, the variational apparatus yields a maximum power, maximum specific impulse thrusting-arc. The optimum steering program, determined numerically through the use of a digital computer, is found to begin slightly below the horizontal, and increases until the thrust direction is exactly aligned with the velocity vector at the terminal point. Several steering programs of a simple analytical form are also computed numerically for a comparison with the optimum program. (Author)

NASA N63-10910 OTS $6.60

National Aeronautics and Space Administration, Washington, D. C.
STATEMENT BY ROBERT C. SEAMANS, JR., ASSOCIATE ADMINISTRATOR, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, BEFORE THE COMMITTEE ON SCIENCE AND ASTRONAUTICS, UNITED STATES HOUSE OF REPRESENTATIVES, FEBRUARY 27, 1962. [1962] 63p.

PB 162 662 OTS $4.60

Naval Weapons Station, Yorktown, Va.
THE APPLICATION OF DIFFERENTIAL THERMAL AND THERMOGRAVIMETRIC ANALYSES TO MILITARY HIGH EXPLOSIVES, by Ernest E. Mason and Hawthorne A. Davis. 22 Jan 60, 47p. NAVORD rept. 5802; AD-232 625.

DESCRIPTORS: *Explosives, *TNT, *RDX, *HMX, *PETN, *Tetryl, *Pentolite, Calorimetry, Gravimetric analysis.

The thermal behavior of the following military explosives has been studied through the use of differential thermal and thermogravimetric analyses: TNT, RDX, HMX, PETN, TETRYL, PENTOLITE, COMPOSITION A-3, COMPOSITION B, COMPOUND CH-6, HBX-1, HBX-3, and H-6. The thermal phenomena as interpreted from the enclosed curves are discussed for each explosive. (Author)

TID-17210 OTS $2.60

Sandia Corp., Albuquerque, N. Mex.
RADIATION DAMAGE TO SATELLITE ELECTRONIC SYSTEMS, by [S. C. Rogers.] Rept. on Contract AT(29-1)789. 26 Oct 63, 29p. SCDC-2843.

PB 162 727 OTS $5.60

United Research, Inc., Cambridge, Mass.
RAPID TRAVERSE WIND MEASURING SYSTEM, by Sidney Lees. Quarterly rept. no. 3, 1 Jan-31 Mar 59, on Trail Measuring Techniques, Contract DA 36-039-sc-78139. [1959] 55p. 2 refs. AD-219 185.

DESCRIPTORS: *Wind, Measurement, *Optical equipment, *Optical tracking, Projectiles, Homing devices, Stereoscopes, Detectors.

The new possibilities for rapid traverse wind measurement techniques are described. These include purely optical systems, optical systems with radio frequency ranging and purely radio frequency systems. In addition to the optical stereoscopic system, using optical tracking heads to determine the position of the target, a technique is possible that uses a fixed head and measures the angular velocity of the target. It is necessary in both techniques to measure range in order to provide normal wind components. Range can be provided optically by locating detectors on a base line, or by radio frequency methods such as radar or interferometry. The uncertainties associated with optical methods are studied. It is seen that the largest source of uncertainty is in the measurement of range, particularly a range of 1000 ft. It is necessary to use a base line 100 ft long to reduce the uncertainty from this cause to a tolerable level. If larger uncertainty at the longer ranges are acceptable, the base line can be reduced. (Author)

NASA N62-13107 OTS $2.60

Virginia Polytechnic Inst., Blacksburg.
THE DYNAMIC BEHAVIOR OF MANNED ROTATING SPACE STATIONS, by Petter R. Kurzhals. [1961] 22p. 3 refs.

PB 162 492 OTS $4.60

Weapons Research Establishment, Salisbury (Australia).
WIND TUNNEL FORCE AND MOMENT TESTS (EXCLUDING DRAG) AT MACH NUMBER 2.58 ON THREE-FIN AND FOUR-FIN MODELS OF THE SKYLARK HIGH ALTITUDE RESEARCH VEHICLE, by D. F. Morrison and J. A. Rein. Feb 62, 41p. 1 ref. Technical note HSA 86; NASA N63-10153.

DESCRIPTORS: *Rocket models, Rockets, High altitude, Aerodynamics, *Aerodynamic configurations, *Airfoils, Stabilizers, Tests, *Wind tunnel models, Moments, Pitch (Motion), Yaw, Roll, Stability, Mach number.

Results are given of measurements of normal force, pitching moment, side force, yawing moment, and rolling moment on three-fin and four-fin models of Skylark with the same individual fin panel areas. The tests were made at incidences up to 20^{o}, and the range of roll angles required by symmetry, at a Mach number of 2.58 and at a Reynolds number of 4.0×10^{6} based on overall length. The four-fin configuration showed a significant reduction in side force and rolling moment over the three-fin arrangement. (Author)

Sanitation and Safety Engineering

AD-294 451 repriced OTS $2.25

Atlantic Research Corp., Alexandria, Va.
HAZARDS OF LIQUID HYDROGEN IN RESEARCH AND DEVELOPMENT FACILITIES, by Guenther von Elbe and Howard T. Scott, Jr. Final rept. for 1 May-1 Nov 62 on Contract AF 33(657)8952. Dec 62, 81p. 27 refs. ASD TDR-62-1027; NASA N63-11878.

DESCRIPTORS: *Liquefied gases, *Hydrogen, *Hazards, Safety, *Combustion, *Detonation, Storage, Laboratories, *Laboratory equipment, Design, Electrical equipment, Sparks, *Fire safety, Detection.

The physical and chemical properties of hydrogen have been summarized with emphasis on the relation of these properties to combustion and detonation processes, and information has been collected on experiences and practices in numerous facilities. Hazards comprise the possibility of pressure rupture of containers, initiation of flammable mixtures formed by release of hydrogen due to vessel failure or other causes, and explosion of hydrogen and contaminating oxygen under cryogenic conditions. It is shown that the theory of chemical reaction provides a complete understanding of the combustion and detonation characteristics of hydrogen-oxygen systems and defines the chemical and physical requirements for inhibition and control of combustion and detonations. Experiences and practices in research and development facilities have been reviewed, and subjects warranting further investigation have been determined. (Author)

TID-16764 $0.75

Atomic Energy Commission. Div. of Operational Safety, Washington, D. C.
A SUMMARY OF INCIDENTS INVOLVING USAEC SHIPMENTS OF RADIOACTIVE MATERIAL, 1957-1961 by D. E. Patterson and V. P. DeFatta. Nov 62, 76p.

FOOD, HANDLING, AND PACKAGING EQUIPMENT

NYO-10411 OTS $1.60

Massachusetts Inst. of Tech., Cambridge.
A STUDY OF THE EFFECTS OF SUB-STERILIZATION DOSES OF RADIATION ON THE STORAGE LIFE EXTENSION OF SOFT-SHELLED CLAMS AND HADDOCK FILLETS, by John T. R. Nickerson and Samuel A. Goldblith. Quarterly progress rept. no. 2, Aug-Oct 62, on Contract AT(30-1)3006. 23 Nov 62, 19p. 3 refs.

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

PB 162 852 OTS $7.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
HUMAN REACTION TO MILITARY-VEHICLE RIDE, by S. Sternick, D. T. Stimmel, and I. J. Sattinger. Rept. on Contract DA 20-018-ORD-19617. Jan 61, 80p. 24 refs. Rept. no. 2889-17-F; AD-250 099.

DESCRIPTORS: *Vehicles, Acceptability, Roll, *Tracking, Test methods, Test equipment, *Tracked vehicles, *Tanks, *Cargo vehicles, *Human engineering, Military personnel, Motion, *Motor reactions, Vibration, Pitch, *Positioning reactions, *Psychomotor tests, *Armored vehicles, *Passenger vehicles, Physiology.

The results of an investigation into the effects of ride on both passengers and crew-members of military ground vehicles are described. A general analysis of these effects is given as a basis for defining the problems associated with vehicle ride and of recommending an experimental program to obtain quantitative information on the effects of ride on comfort and performance. Test techniques and test equipment requirements for comfort tests using the method of adjustment and for performance tests using tracking, driving, visual recognition, and information-handling tasks are outlined. These tests are based on the use of a vehicle-motion simulator which would subject human beings to prescribed sinusoidal and transient motions. As an example of how the various test phases can be performed, a suggested first year's test program is developed to obtain data on the subjective evaluations of sinusoidal and non-sinusoidal motions in pitch and roll. (Author)

Manufacturing Equipment and Processes

DC-61-7-27 OTS $2.60

General Electric Co., Cincinnati, Ohio.
PROPOSED LiH CASTING BY THE SAND SUPPORT LOCAL HEAT METHOD, by J. G. Attanas. 14 July 61, 28p.

TID-17376 OTS $2.60

Union Carbide Nuclear Co., Oak Ridge, Tenn.
A MAINTENANCE PROGRAM FOR NUMERICAL CONTROL SYSTEMS ON MACHINE TOOLS, by E. W. Pipes. Rept. on Contract W7405-eng-26. 6 Dec 62, 28p.

Y-KB-22 OTS $2.60

Union Carbide Nuclear Co., Oak Ridge, Tenn.
TESTS OF A PROPOSED URANIUM CONTAINER, by J. D. McLendon. Rept. on Contract W7405-eng-26. 3 Dec 62, 28p. 6 refs.

PB 181 404 OTS $0.50

Williams, Clyde, and Co., Columbus, Ohio.
ULTRASONIC-ASSISTED GRINDING. A POSSIBLE NEW METHOD FOR MACHINING SPACE AGE MATERIALS, by Robert E. Greenlee and William H. Bickley. Rept. on Contract CC-4569. [1962] 15p. 12 refs.

DESCRIPTORS: *Material removal, *Machining, Grinders, *Ultrasonics, Vibration, Theory, Manufacturing methods, Industrial research.

MATERIALS

PB 162 665 Available on loan from OTS

Denman [Tire and] Rubber Co. [Warren, Ohio].
DEVELOPMENT OF OZONE AND/OR OXYGEN RESISTANT POLYMERS, by C. G. Miller, Andrew Tomlin and D. E. Baker. Technical rept. nos. 1-3 (Final), 21 Apr 53-20 Apr 54, on Contract DA 20-089-ORD-36580. [1954] 28p. AD-41 995.

DESCRIPTORS: *Polymers, *Synthetic rubber, Tires, Aging, *Ozone, *Antioxidants, Chemical reactions, Tests.

Data are presented for ozone and weathering tests of Denman base treads 397-C and 423-A with added antioxidants and wax. Santoflex B-Flectol H-140°F paraffin in cold rubber tread, and Denman base treads 397 A, B, and C. Results of the tests conducted to determine the usefulness of Santoflex A, Santoflex 35, Flectol H, Bayer 4010, and Yellow 10010 as ozone resisters are included. (ASTIA abstract)
NASA N63-12591 OTS $0.50

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
BOUNDARY LUBRICATION CHARACTERISTICS OF A TYPICAL BEARING STEEL IN LIQUID OXYGEN, by William F. Hady, Gordon P. Allen, and Robert L. Johnson. Feb 63, 16p. 10 refs. Technical note D-1580.

PB 162 620 OTS $9.60

Martin [Marietta Corp.] Baltimore, Md.
EVALUATION OF ULTRA-SONIC TEST DEVICES FOR INSPECTION OF ADHESIVE BONDS, by John P. Reese, Von H. Boruff, and E. C. Burkhardt. Quarterly progress rept. no. 5, 1 July-30 Sep 60, on Contract NOas-59-6266-c. [1960] 117p. 12 refs. Rept. no. ER 10911-5; AD-246 575.

DESCRIPTORS: *Non-destructive testing, *Ultrasonics, *Bonded joints, Adhesives, Test equipment, Test sets, Laminates, Sandwich construction.

Flatwise tension test specimens were prepared from the same sandwich panels that supplied the test specimens for the peel tests. The exact degree of correlation between bond strength and test instrument readings were not determined, but the Fokker Bond Tester, the Coinda-Scope, and STUB-Meter were able to detect differences in response between standard and imperfect bonds. Tensile shear tests were made on specimens from test panels prepared by bonding 0.063-in.-thick 2024-T3 alclad with a 1/2-in. everlap, using FM-47, HT-424, FM-58, and Metlbond 4021 adhesives. Each of the test devices was capable of detecting a difference in the panels exposed to 500 degrees F and the control panels. Similar panels were subjected to simulated aging by exposure to fatigue and salt spray. The test instruments were able to detect variations in bonding of honeycomb sandwich panels with 0.063-in. 7075-T6 alclad faces and 3/16-0.002-in. cores and bonded with FM-47, AT-424, FM-58 and Metlbond 406 adhesives.

PB 181 405 OTS $0.50

Williams, Clyde, and Co., Columbus, Ohio.
STRUCTURAL ADHESIVES FOR METAL-TO-METAL BONDING, by W. A. Losoncy, Jr. and R. E. Greenlee. Rept. on Contract CC 4569. [1962] 20p. 21 refs.

DESCRIPTORS: Metals, *Bonding, *Adhesives, Thermoplastics, Thermosetting plastics, Elastomers.

Ceramics and Refractories

NAA-SR-7637 $0.50

Atomics International, Canoga Park, Calif.
RAPID OXYGEN DIFFUSION IN BeO, by S. B. Austerman and R. A. Meyer. Rept. on Contract AT(11-1)GEN-8. 30 Nov 62, 14p. 3 refs.

TID-17180 OTS $4.60

Brookhaven National Lab., Upton, N. Y.
EFFECTS OF RADIATION ON GLASS. Bibliography, by M. Comstock and P. Ferrigno. Rept. on Contract AT(30-2)GEN-16. 16 Nov 62, 41p. BNL-6513.

GEMP-17A $1.25

General Electric Co., Cincinnati, Ohio.
HIGH-TEMPERATURE MATERIALS PROGRAM. Progress rept. no. 17, Part A, on Contract AT(40-1)-2847. 15 Nov 62, 53p. 16 refs. NASA N63-10103.

GEMP-18A $1.00

General Electric Co., Cincinnati, Ohio.
HIGH-TEMPERATURE MATERIALS PROGRAM. Progress rept. no. 18, Part A, on Contract AT(40-1)2847. 14 Dec 62, 37p. 32 refs. NASA N63-11211.

TID-17322 OTS $6.60

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
MATERIALS FOR HIGH TEMPERATURE NUCLEAR ENGINEERING APPLICATIONS, by J. D. Fleming, J. W. Johnson and others. Summary rept. no. 1, 1 June 61-1 June 62, on Contracts AT(40-1)2483. 1962. 68p. 11 refs.

TID-17339 OTS $1.10

Knolls Atomic Power Lab., Schenectady, N. Y.
THERMAL EXPANSION OF POLYCRYSTALLINE LANTHANUM SESQUIOXIDE AND NEODYMIUM SESQUIOXIDE, by R. E. Mistler, G. L. Ploetz, and J. A. Smith. Rept. on Contract W31-109-eng-52. 4 Dec 62. 10p. 1 ref.

UCRL-6800 $1.60

Lawrence Radiation Lab., U. of California, Livermore.
BeO STUDIES: SINTERING OF BERYLLIA POWDERS, by Raymond Cooperstein. Rept. on Contract W7405-eng-48. 8 Mar 62, 15p. 11 refs.

NASA N63-12193 OTS $1.00

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
COMPATIBILITY OF MOLTEN URANIUM DIOXIDE WITH FIVE REFRACTORY MATERIALS, by William A. Sanders and Isadore L. Drell. Jan 63, 33p. 16 refs. Technical note D-1442.

ORNL-TM-413 OTS $1.60

Oak Ridge National Lab., Tenn.
BRAZING OF CERAMICS, by C. W. Fox. Progress rept. on Contract W7405-eng-26. 8 Nov 62, 20p. 7 refs.

MATHEMATICS

TID-17315 OTS $3.60

Bell Telephone Labs., Inc., Murray Hill, N. J.
VERTICAL VELOCITY COMPUTER DATA SMOOTHING POSSIBILITIES, by Sidney Darlington. 31 Mar 50, declassified 6 May 58. 33p. SCDC-2952.

WAPD-T-1211 OTS $3.60

Bettis Atomic Power Lab., Pittsburgh, Pa.
ON A NUMERICAL APPROXIMATION TO THE SOLUTION OF PARABOLIC EQUATIONS IN ONE SPACE VARIABLE, by John P. Dorsey. Rept. on Contract AT(11-1)GEN-14. Sep 62, 35p. 8 refs.

NASA N63-12032 OTS $3.60

Boston U., Mass.
THE TRANSFORMATION BETWEEN CARTESIAN AND CONIC COORDINATES, by L. Belsky. Research rept. no. 1 on Grant NsG-246-62. Aug 62, 40p. 1 refs. Astronomical Contributions series II, number 21.

BNL-760(T-282) $2.00

Brookhaven National Lab., Upton, N. Y.
RANDOM MATRIX DIAGONALIZATION - A COMPUTER PROGRAM, by K. Fuchel, Rita J. Greibach, and C. E. Porter. [Rept. on Contract AT(30-2)GEN-16]. Sep 62, 81p.

TID-17355 OTS $7.60

New Mexico U., Albuquerque.
RESEARCH IN DIFFERENTIAL TOPOLOGY AND ON ALGEBRAIC STRUCTURES, by Oswald Wyler. Oct 62, 78p. 17 refs. SCDC-2933.

PB 162 655 OTS $1.60

Princeton U. [School of Engineering] N. J.
ENGINEERING GRAPHICS SEMINAR. ON GRAPHICAL SOLUTIONS OF FIRST ORDER DIFFERENTIAL EQUATIONS, by Forrest Woodworth. (Detroit U.). 13 Nov 61, 16p. Technical Seminar Series rept. no. 1.

DESCRIPTORS: *Symposia, *Differential equations, Integration, Functions, Nomographs, Numerical methods and procedures, Engineering, Mathematics.

PB 162 656 OTS $3.60

Princeton U. School of Engineering, N. J.
ENGINEERING GRAPHICS SEMINAR. ON N-DIMENSIONAL DESCRIPTIVE GEOMETRY AND MULTIVARIABLE FUNCTIONS, by Steven Anson Coons (Massachusetts Inst. of Tech.). 5 Dec 61, 39p. Technical Seminar Series rept. no. 2; NASA N62-17997.

DESCRIPTORS: *Symposia, *Geometry, *Functions, Equations, Engineering, Mathematics.

PB 162 657 OTS $9.10

Princeton U. School of Engineering, N. J.
ENGINEERING GRAPHICS SEMINAR. THE TANGENT LINE ALIGNMENT, by John A. Fasal (Kidde, Walter and Co.). 16 Apr 62, 109p. Technical Seminar Series rept. no. 3

DESCRIPTORS: *Symposia, *Nomographs, Functions, Engineering, Mathematics.

A simple means for the representation of n-variable functions and empirical relations.

PB 162 658 OTS $6.60

Princeton U. School of Engineering, N. J.
ON COMPUTER-AIDED GRAPHICAL KINEMATIC SYNTHESIS, by George N. Sandor (Yale U.). 20 Nov 62, 65p. 23 refs. Technical Seminar Series rept. no. 4.

DESCRIPTORS: *Mechanics, *Synthesis, *Digital computers, Computers, Scheduling, Plotters, Geometry, Complex numbers, Analytic geometry, Symposia.

The purpose of this presentation is to introduce and illustrate a recently conceived philosophy in Kinematic Synthesis featuring a co-ordinated interplay between graphics and automatic computation, which, it is hoped, may open up a new and fertile field for applied graphics research.

TID-15458 OTS $1.60

Sandia Corp., Albuquerque, N. Mex.
DIFFERENCE APPROXIMATIONS TO DIFFERENTIAL EQUATIONS IN A BANACH SPACE, by Robert J. Thompson. Rept. on Contract AT(29-1)789. 23 Apr 62, 17p. 5 refs.

MECHANICS

NASA N63-12590 OTS $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
THE IN-PLANE VIBRATIONS OF A FLAT SPINNING DISK, by James G. Simmonds. Dec 62, 41p. 4 refs. Technical note D-521.

NASA N63-12479 OTS $0.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
EXPERIMENTAL EVALUATION OF THEORETICAL ELASTIC STRESS DISTRIBUTIONS FOR CYLINDER-TO-HEMISPHERE AND CONE-TO-SPHERE JUNCTIONS IN PRESSURIZED SHELL STRUCTURES, by William C. Morgan and Peter T. Bizon. Feb 63, 28p. 8 refs. Technical note D-1565.

LAMS-2745 $1.75

Los Alamos Scientific Lab., N. Mex.
DIFFERENCE EQUATIONS FOR PLANE THERMAL ELASTICITY, by George N. White, Jr. Rept. on Contract W-7405-eng-36. Aug 62, 67p. 5 refs. NASA N62-17276.

TID-17498 OTS $16.50

New Mexico U., Albuquerque.
ON THE USE OF PLASTIC MODELS IN THERMAL STRESS STUDIES, by C. W. Theisen, S. Thunborg, and R. Dove. 1 July 62, 259p. 38 refs. Technical rept. ME-3.

Aerodynamics and Pneumatics

NASA N63-11846 OTS $3.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AERODYNAMIC CHARACTERISTICS OF FOUR-DUCT TANDEM VTOL-AIRCRAFT CONFIGURATIONS, by William A. Newsom, Jr. jan 63, 152p. 2 refs. Technical note D-1481.

NASA N63-12287 OTS $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EXPERIMENTAL AND THEORETICAL STUDIES OF THE EFFECTS OF CAMBER AND TWIST ON THE AERODYNAMIC CHARACTERISTICS OF PARAWINGS HAVING NOMINAL ASPECT RATIOS OF 3 AND 6, by Edward C. Polhamus and Rodger L. Naeseth. Jan 63, 37p. 15 refs. Technical note D-972.

NASA N63-12498 OTS $6.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
HEAT-TRANSFER MEASUREMENTS OF TWO WING-BODY COMBINATIONS AT 8° ANGLE OF ATTACK FROM A FLIGHT TEST FOR MACH NUMBERS TO 4.86 AND REYNOLDS NUMBERS TO 19.2×10^6, by Katherine C. Speegle. Dec 58, declassifed 1 Dec 62. 61p. 18 refs. NASA MEMO-10-25-58L.

NASA N63-12478 OTS $1.25

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
HEAT TRANSFER IN LAMINAR FLOWS OF INCOMPRESSIBLE FLUIDS WITH $Pr \to 0$ AND $Pr \to \infty$, by Ernst W. Adams. Feb 63, 42p. 23 refs. Technical note D-1527.

PB 162 726 OTS $5.60

North American Aviation, Inc., Downey, Calif.
THE LAMINAR BOUNDARY LAYER WITH VARIABLE FLUID PROPERTIES, by E. R. Van Driest. Rept. on Contract W33-038-ac-14191. 19 Jan 54, 51p. 7 refs. Rept. no. AL-1866; AD-40 547.

DESCRIPTORS: *Laminar boundary layer, Fluid dynamic properties, Friction, Heat transfer, Mach number, Aerodynamic configurations *Flat plate models

The Crocco laminar boundary-layer analysis for zero pressure gradient is extended to include variable Prandtl number. Results of extensive calculations of friction and heat-transfer coefficients, as well as of recovery and Reynolds-analogy factors for laminar flow of air on flat plates in free flight and in heated wind tunnels, are presented. These represent exact calculations with variable specific heat, viscosity, and Prandtl number, based on the NBS-NACA Tables of Thermal Properties of Gases. Dependence of the recovery and Reynolds-analogy factors on Mach number, free-stream temperature, and heat transfer is clearly seen. The theory is compared to some experimental data on recovery factor. The cooling required for complete stabilization of the boundary layer with respect to two-dimensional disturbances is calculated. Dissociation effects have been neglected in the general analysis.

Hydrodynamics, Hydraulics, and Hydrostatics

PB 162 851 OTS $6.60

[Hydrodynamics Lab.] Calif. Inst. of Tech., Pasadena, Calif.
EXPERIMENTAL INVESTIGATIONS OF THREE-DIMENSIONAL EFFECTS ON CAVITATING HYDROFOILS, by R. W. Kermeen. Rept. on Contract Nonr-220(12). Sep 60, 70p. 7 refs. Rept. no. 47-14; AD-245 864.

DESCRIPTORS: *Hydrofoils, *Hydrodynamic configurations, Wedges, Fluid dynamic properties, *Cavitation, Aspect ratio, Drag, Lift, Moments, Pitch (Motion), Stability, Water tunnels.

The hydrodynamic characteristics of a family of three-dimensional sharp-edged hydrofoils were investigated. Four rectangular plan-form, 6 deg wedge profiles with aspect ratios of 4.0, 2.0, 1.0 and 0.5 were tested over a range of cavitation numbers from non-

cavitating to fully cavitating flow. The effects of aspect ratio on the flow and cavity configurations and on the lift, drag and pitching moment are discussed. The effects of cavitation on the force and moment coefficients for the low-aspect ratio hydrofoils of these tests were essentially the same as on two-dimensional profiles.

NASA N63-12245 OTS $0.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
A VISUAL STUDY OF TWO-PHASE FLOW IN A VERTICAL TUBE WITH HEAT ADDITION, by Yih Yun Hsu and Robert W. Graham. Jan 63, 23p. 14 refs. Technical note D-1564.

METALLURGY

WAPD-TM-325 $0.75

Bettis Atomic Power Lab., Pittsburgh, Pa.
SOME INFORMATION ON THE METALLOGRAPHIC APPEARANCE OF HAFNIUM, by J. G. Goodwin. Rept. on Contract AT(11-1)-GEN-14. Sep 62, 33p. 3 refs.

PB 162 850 OTS $3.60

Brussels [Free] U. (Belgium).
VAPORIZATION OF COMPOUNDS AND ALLOYS AT HIGH TEMPERATURE. PART I. MASS SPECTROMETRIC DETERMINATION OF THE DISSOCIATION ENERGIES OF THE MOLECULES AgAu, AgCu, AND AuCu, by Marcel Ackerman, Fred E. Stafford, and J. Drowart. Rept. for Mar 59-Mar 60, on Refractory Inorganic Nonmetallic Materials, Contract AF 61(052)225. Nov 60, 31p. 32 refs. WADD Technical rept. 60-782, Part I.

DESCRIPTORS: Alloys, Vaporization, *Gold alloys, *Silver alloys, *Copper alloys, Molecules, Dissociation, Energy, Mass spectroscopy, High temperature research, Refractory materials.

Dissociation energies, D_0^o of gaseous diatomic molecules are determined: $Cu_2 = 43.2$, $Ag_2 = 35.7$, $Au_2 = 51.9$, AgAu = 47.6, AgCu = 40.7, AuCu = 54.5 based on $\Delta H^{vap} = 81.1$, 68.4 and 87.5kcal for Cu, Ag and Au. Correlations with electronegativities and ΔH mixing are indicated. (Author)

DRI-2075 OTS $1.10

Denver Research Inst., Colo.
AN INVESTIGATION OF THE EFFECT OF METALLIC ADDITIONS UPON THE OXIDATION RESISTANCE OF TITANIUM-MODIFIED $NbAl_3$, by Walter Wheatfall and Donald T. Klodt. Quarterly progress rept. no. 1, 1 Sep-30 Nov 62, on Contract AT(11-1)1092. Dec 62, 9p.

DRI-2061 OTS $4.60

Denver Research Inst., Colo.
AN INVESTIGATION OF THE EFFECT OF METALLIC ADDITIONS UPON THE OXIDATION RESISTANCE OF $NbAl_3$, by Walter L. Wheatfall and Donald T. Klodt. Interim rept. 1 Sep 61-31 Aug 62, on Contract AT(11-1)1092. Sep 62, 45p.

GAT-T-908 OTS $1.60

Goodyear Atomic Corp., Portsmouth, Ohio.
THE PRECISE AND ACCURATE DETERMINATION OF THE LATTICE PARAMETER OF TUNGSTEN USING THE LIKELIHOOD RATIO METHOD, by Karl E. Beu. Rept. on Contract AT(33-2)1. 1 Nov 62, 13p.

GAT-T-1053 OTS $2.60

Goodyear Atomic Corp., Portsmouth, Ohio.
X-RAY FLUORESCENCE ANALYSIS FOR URANIUM IN AN ALUMINUM ALLOY MATRIX, by F. J. Musil. Rept. on Contract AT(33-2)1. 25 July 62, 9p.

LAMS-2779 $1.00

Los Alamos Scientific Lab., N. Mex.
BIBLIOGRAPHY ON CORROSION BY LIQUID METALS (1957-SEPTEMBER 1962) comp. by Helen J. Chick. Rept. on Contract W7405-eng-36. 12 Oct 62, 36p. NASA N63-11055.

TID-14497 OTS $3.60

Los Alamos Scientific Lab., N. Mex.
THE DEVELOPMENT OF HIGH PURITY TANTALUM AND ALLOYS FOR LIQUID PLUTONIUM CONTAINMENT IN LAMPRE I, by Richard M. Bidwell, William E. Ferguson and others. Rept. on Contract W7405-eng-36. Jan 62, 35p. 22 refs. LADC-4969.

TID-17372 OTS $1.60

Savannah River Lab., Aiken, S. C.
TENSILE PROPERTIES OF ZIRCALOY WITH ORIENTED HYDRIDES, by R. P. Marshall and M. R. Louthan, Jr. Rept. on Contract AT(07-2)1. 13 Nov 62, 15p. 3 refs.

TID-17334 OTS $1.10

W. M. Keck Lab. of Engineering Materials, Calif. Inst. of Tech., Pasadena.
HEXAGONAL CLOSE-PACKED STRUCTURES IN Bi-Pb ALLOYS AND THE POLYMORPHISM OF LEAD AT HIGH PRESSURE, by W. Klement, Jr. Technical rept. no. 9 on Contracts AT(04-3)221 and Nonr-220(30). Oct 62, 9p. 16 refs.

Ferrous Metals

PB 162 774 OTS $6.60

Institute of Engineering Research, U. of California, Berkeley.
INVESTIGATIONS ON THE MECHANISM ON THE STRAIN INDUCED MARTENSITIC REACTION IN 18-8 STAINLESS STEEL, by C. Dean Starr, M. Reporter, and J. E. Dorn. Technical rept. no. 15 on Contract N7onr-295, T.O. II. 15 June 51, 63p. 23 refs. Series no. 22, issue no. 15; ATI-121 264.

DESCRIPTORS: *Stainless steel, Physical properties, Heat treatment, Annealing, Quenching (Cooling), *Phase transitions, *Martensite, Austenite, Crystal structure, Crystal growth, Shear stresses, Energy, Plasticity

An analytic formulation of the shear mechanism of martensite formation is developed. The analytic theory and deformation studies indicate that some of the details of the Cohen postulates for martensite formation require modification. In particular it appears to be highly improbable that embryos are produced by thermal fluctuations at the annealing temperature and are then frozen in situ upon quenching. It is more likely that small shear strain embryos are produced by thermal fluctuations. Due to the anisotropic nature of these preembryonic regions, high stresses are introduced during cooling which generate active embryonic regions. It has been shown that no unique plastic critical point exists. The effect of flow stress and plastic strain on the martensite reaction have been investigated. Stress appears to have a minor effect in inducing the reaction to occur. The effect of strain appears to induce higher shear strain energy embryos. (Author)

MSAR-62-126 OTS $4.60

MSA Research Corp., Callery, Pa.
EFFECT OF 1200°F SODIUM ON AUSTENITIC AND FERRITIC STEELS. Progress rept. 25 for Sep 62, on Contract AT(11-1)765. 19 Oct 62, 42p.

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

IS-476 $0.50

Ames Lab., Iowa State U. of Science and Tech.
INFLUENCE OF FIELD SHAPE DEVIATIONS ON ELECTRON ORBITS IN MAGNETIC BETA-RAY SPECTROMETERS, by H. Daniel and L. Jackson Laslett. Rept. on Contract W7405-eng-82. June 62, 13p. 6 refs.

IS-506 $2.50

Ames Lab., Iowa State U. of Science and Tech.
LARGE ANGLE PAIR PRODUCTION, by James David Plimpton and Charles L. Hammer. Rept. on Contract W7405-eng-82. Aug 61, 137p. 57 refs.

ANL-FGF-318 OTS $1.60

Argonne National Lab., Ill.
ELECTRODEPOSITION OF PLUTONIUM FROM MOLTEN SALT SOLUTIONS OF Cs_2PuCl_6, by M. B. Brodsky and G. F. Carleson. Rept. on Contract W31-109-eng-38. 30 Nov 61, 14p. 14 refs. UAC-5872.

ANL-FGF-378 OTS $2.60

Argonne National Lab., Ill.
NEUTRON RADIOGRAPHY, by Harold Berger. Progress rept. on Contract W31-109-eng-38. 17 Aug 62, 27p. 33 refs. UAC-6888.

NAA-SR-7136 $1.00

Atomics International, Canoga Park, Calif.
LOW DECONTAMINATION REPROCESSING STUDIES ON IRRADIATED URANIUM DIOXIDE REACTOR FUEL, by J. Guon, J. E. Bodine and others. Rept. on Contract AT(11-1)GEN-8. 30 Nov 62, 37p. 9 refs.

NAA-SR-7138 $1.25

Atomics International, Canoga Park, Calif.
MULTICYCLE REPROCESSING AND REFABRICATION EXPERIMENTS ON SIMULATED UO_2-FISSIA PELLETS, by S. Strausberg. Rept. on Contract AT(11-1)-GEN-8. 30 Aug 62, 51p. 6 refs.

WAPD-T-1305 OTS $2.60

Bettis Atomic Power Lab., Pittsburgh, Pa.
TRANSFORMATIONS BETWEEN HALF-RANGE AND FULL-RANGE ANGULAR EXPANSIONS AND THE TRANSPORT PROBLEM, by Bruce D. O'Reilly. Rept. on Contract AT(11-1)GEN-14. Mar 61, 21p. 7 refs.

BNL-5648 OTS $1.10

Brookhaven National Lab., Upton, N. Y.
CONCERNING THE POLARIZATION OF PROTONS IN Pd-Ni ALLOY, by R. Schermer and V. L. Sailor. 6 Oct 61, 6p. 2 refs.

BNL-5987 OTS $1.60

Brookhaven National Lab., Upton, N. Y.
DETERMINATION OF DIFFUSION COOLING IN GRAPHITE BY MEASUREMENT OF THE AVERAGE NEUTRON VELOCITY, by E. Starr and J. W. L. de Villiers. 2 Jan 62, 16p. 4 refs.

TID-17266 OTS $1.60

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
RADIATION-INDUCED CYANOGENATION OF ORGANIC COMPOUNDS, by James A. Knight, Jr. Quarterly technical status rept. no. 8, 1 July-30 Sep 62, on Contract AT(38-1)202. 26 Nov 62, 12p.

NASA N63-12346 OTS $1.10

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
ANALYSIS OF A SKIMMER FOR A HIGH-INTENSITY MOLECULAR BEAM USING A THREE-FLUID MODEL, by Richard A. Oman. Rept. on Contract NASr-104. Oct 62, 14p. 2 refs. Research Dept. Memo. RM-214.

HW-SA-2550 OTS $1.10

Hanford Atomic Products Operation, Richland, Wash.
ELECTRON MICROSCOPY LABORATORY, by J. L. Daniel. Rept. on Contract AT(45-1)1350. 24 Apr 62, 9p.

HW-SA-2497 OTS $1.60

Hanford Atomic Products Operation, Richland, Wash.
FISSION-INDUCED VAPORIZATION OF UO_2 FROM A SOURCE AND SUBSEQUENT CONDENSATION ON COLLECTORS EXPOSED TO FISSION FRAGMENT BOMBARDMENT, by T. K. Bierlein and B. Mastel. Rept. on Contract AT(45-1)1350. 16 Mar 62, 13p. 8 refs.

TID-17369 OTS $1.60

Illinois Inst. of Tech., Chicago.
THE KINETICS OF ACID-CATALYZED AROMATIC HYDROGEN EXCHANGE IN METHOXYBENZENES, by A. J. Kresge and Y. Sato. [1961] 14p. 6 refs.

TID-15405 OTS $3.60

Knolls Atomic Power Lab., Schenectady, N. Y.
APPLICATIONS OF THE SYNTHETIC METHOD, by Harold J. Kopp. Rept. on Contract W31-109-eng-52. 9 Apr 62, 31p. 3 refs.

KAPL-2225 $1.25

Knolls Atomic Power Lab., Schenectady, N. Y.
KERNEL AND PAM - PROGRAMS FOR USE IN THE CALCULATION OF THE THERMAL SCATTERING MATRIX FOR CHEMICALLY BOUND SYSTEMS, by F. D. Federighi and D. T. Goldman. Rept. on Contract W-31-109-eng-52. 17 Sep 62, 28p. 7 refs. NASA N63-10501.

TID-13710 OTS $4.60

Knolls Atomic Power Lab., Schenectady, N. Y.
MICROSCOPIC SELF-SHIELDING, by Charles H. Randall. Rept. on Contract W31-109-eng-52. 2 Oct 61, 47p. 10 refs.

TID-15404 OTS $2.60

Knolls Atomic Power Lab., Schenectady, N. Y.
SYNTHETIC METHOD SOLUTION OF THE TRANSPORT EQUATION, by H. J. Kopp. Rept. on Contract W31-109-eng-52. 9 Apr 62, 29p. 3 refs.

UCRL-6558-T OTS $1.10

Lawrence Radiation Lab., U. of California, Livermore
UNIQUENESS AND REARRANGEMENT COLLISIONS, by B. A. Lippmann. Rept. on Contract W7405-eng-48. 21 July 61, 7p. 5 refs.

TID-14794 OTS $3.60

Los Alamos Scientific Lab., N. Mex.
AN EMPIRICAL APPROACH TO THE PROBLEM OF ANOMALOUS DISPERSION, by R. B. Roof, Jr. Rept. on Contract W7405-eng-36. 8 Feb 62, 36p. LADC-5232.

LA-2743 $1.75

Los Alamos Scientific Lab., N. Mex.
LIFETIME OF NEUTRONS IN REFLECTORS, by Kenneth M. Kupferberg. Rept. on Contract W-7405-eng-36. Sep 62, 67p.

K-1548 $1.00

Oak Ridge Gaseous Diffusion Plant, Tenn.
PHYSICAL AND CHEMICAL PROPERTIES OF SOME MATERIALS USED IN THE ANCO AND ELEMENTAL BORON PROCESSES, by E. J. Barber. Rept. on Contract W-7405-eng-26. 8 Oct 62, 42p. 95 refs.

IDO-14594 $1.00

Phillips Petroleum Co., Idaho Falls.
AN IMPROVED AQUEOUS PROCESS FOR ZIRCONIUM ALLOY NUCLEAR REACTOR FUELS. PART I. PRELIMINARY LABORATORY STUDIES, by K. L. Rohde, B. J. Newby, and others. Rept. on Contract AT(10-1)205. 30 Oct 62, 44p. 14 refs.

TID-14927 OTS $2.60

Sandia Corp., Albuquerque, N. Mex.
KINETICS FOR THE RADIATION INDUCED REACTIONS OF METHYLENE BLUE IN AQUEOUS SOLUTIONS, by Irving Auerbach. Rept. on Contract AT(29-1)789. 1961. 25p. 8 refs.

DP-771 $0.50

Savannah River Lab., Aiken, S. C.
ANALYTICAL TECHNIQUES FOR THE USE AND CONTROL OF TRITIUM AT SAVANNAH RIVER, by E. L. Albenesius and L. H. Meyer. Rept. on Contract AT(07-2)1. Sep 62, 18p. 18 refs.

Elementary Particles

NYO-9286 OTS $6.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
MEASUREMENTS OF NEGATIVE MUON LIFETIMES IN LIGHT ISOTOPES, by Morton Eckhause. Doctoral thesis. Rept. on Contract AT(30-1)882. Feb 62, 70p. 46 refs.

TID-17251 OTS $1.60

Columbia U., New York.
SPIN 1/2 WAVE EQUATION IN DE-SITTER SPACE, by F. Gursey and T. D. Lee. 28 Nov 62, 18p. 4 refs.

NASA N63-12347 OTS $2.60

Enrico Fermi Inst. for Nuclear Studies, U. of Chicago, Ill.
PRIMARY COSMIC RAY AND SOLAR PROTONS II, by Peter Meyer and Rochus Vogt. Rept. on Grant NsG-144-61. Dec 62, 22p. 14 refs. EFINS-62-57.

TID-14840 OTS $1.60

Laboratory for Nuclear Science, Mass. Inst. of Tech., Cambridge.
A STUDY OF THE K^+ DECAY, by A. M. Boyarski, E. C. Loh and others. Rept. on Contract AT(30-1)2098. 1 Dec 62, 22p. 13 refs.

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DESCRIPTORS: *Nuclear power plants, *Reactor hazards, Reactor safety systems, Radioactive waste, Radiological contamination, *Arctic regions.

As a consequence of several design changes in the PM-2A Nuclear Power Plant after the preparation of the original Hazards Summary Report, amendments to this report are required to reflect these changes. There is no change in the conclusions of the original report. There will be no hazard to personnel when the Nuclear Power Plant is operating under normal conditions, and there is no major hazard to personnel should the maximum credible accident occur.

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Lawrence Radiation Lab., U. of California, Berkeley.
RECENT SUPERCONDUCTIVITY TESTS AND STUDIES, by Paul R. Aron, H. Paul Hernandez, and Harley C. Hitchcock. Rept. on Contract W7405-eng-48. 15 Aug 61, 26p. 16 refs.

TID-17044 OTS $1.60

National Lead Co. of Ohio, Cincinnati.
DETERMINATION OF PORE SIZE DISTRIBUTION OF SOLIDS FROM NITROGEN ADSORPTION DATA, by W. G. Ellis and E. A. Brown. Rept. on Contract AT(30-1)1156. [1955] 15p. 4 refs.

PB 159 215 OTS $6.60

Purdue Research Foundation [Lafayette, Ind.]
THE OXIDATION AND STOICHIOMETRY OF PRASEODYMIUM AND CERIUM OXIDES, by A. F. Clifford. Final rept. on Contract AF 18(603)45. 31 Aug 61, 64p. 69 refs. AFOSR-1897.

DESCRIPTORS: *Semiconductors, *Impurities, Rare earth compounds, *Praseodymium compounds, Cerium compounds, Oxides, Carbonates, Oxidation, *Thermochemistry, Hysteresis, Domains (Crystallography), Crystal structure, Resistance, Low pressure research, Spectra (Infrared), X-ray diffraction analysis, Gas generating systems, Oxygen.

Contents:
Experimental equipment
The PrO_x-O_2 isotherms--experimental results and discussion
A proposed model of a PrO_x domain
The stoichiometry and resistivity of PrO_x
The infrared spectra of praseodymium oxide and praseodymium carbonate
An x-ray study on several samples of PrO_x
A praseodymium-oxide oxygen generator

Thermodynamics

BNL-5615 OTS $4.60

Brookhaven National Lab., Upton, N. Y.
UNILATERAL HEAT TRANSFER TO LIQUID METALS FLOWING IN CONCENTRIC ANNULI, by O. E. Dwyer and P. S. Tu. 10 July 61, 41p. 22 refs.

Order from GPO $0.50 as C-13.46:154-A

Cryogenic Engineering Lab., National Bureau of Standards, Boulder, Colo.
THE THERMODYNAMIC PROPERTIES OF HELIUM FROM 6 TO 540° R BETWEEN 10 AND 1500 PSIA, by Douglas B. Mann. Jan 62, 92p. 16 refs. Technical note 154A.

DESCRIPTORS: *Thermodynamics, Temperature, Pressure, *Helium, Physical properties, Volume, Enthalpy, Entropy, Energy, Tables.

The specific volume, enthalpy, entropy, and internal energy values of helium are presented in tabular form as functions of pressure and temperature. Data are tabulated in two degree Rankin increments for thirty-six isobars between 10 psia and 1500 psia. A comparison with previously published data is made where applicable. An expression is presented which represents the pressure-density-temperature surface based on previously published data. The tabulation is presented in the dimensional units of the British system, but is also available in the dimensional units of the metric system. (Author)

UCRL-9840 $5.60

Lawrence Radiation Lab., U. of California, Berkeley.
THERMODYNAMIC PROPERTIES OF GASEOUS METAL DIHALIDES, by Leo Brewer, G. R. Somayajulu and Elizabeth Brackett. Rept. on Contract W7405-eng-48. Sep 61, 51p. 90 refs.

AD-280 481 OTS $1.60

Wisconsin U., Madison.
THE JOULE-THOMSON EFFECT IN FLUIDS OR SPECIFICALLY A NEW MEASUREMENT OF THE WORK EQUIVALENT OF HEAT USING THE JOULE-THOMSON EFFECT IN WATER, by John R. Roebuck. Final rept. 30 June 53-31 Dec 59, on Contract DA 11-022-ORD-1224, continuation of Contract N8onr-72200. 23 Feb 60, 16p. 2 refs. Rept. no. 728.1-P.

DESCRIPTORS: *Joule-Thomson effect, Heat, Measurement, *Water, Reciprocating pumps, Filters (Fluid), Fluids, Resistance thermometers, Platinum.

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

GAT-T-955 OTS $1.60

Goodyear Atomic Corp., Portsmouth, Ohio.
AN EXACT ECCENTRICITY CORRECTION FOR CYLINDRICAL DIFFRACTION FILM CAMERAS, by K. E. Beu and D. L. Scott. Rept. on Contract AT(33-2)1. 12 Oct 61, 13p. 11 refs.

NASA N63-11702 OTS $1.60

New York U. Coll. of Engineering, N. Y.
MULTISIGNAL CODING FOR SPACE TELEMETRY, by Ludwik Kurz. Technical memo. no. 26 on Contract NAS5-408. 11 May 62, 14p. 2 refs.

PB 162 494 OTS $16.50

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
SENTENCE PARSING WITH A SELF-ORGANIZING HEURISTIC PROGRAM, by Kenneth C. Knowlton. Doctoral thesis. Sep 62, 256p. 30 refs.

DESCRIPTORS: *Machine translation, Digital computers, Programming (Computers), *Programming language, Language, Vocabulary, Pattern recognition, Probability, English language.

Self-organizing heuristic search procedures for automatic sentence parsing have been studied. Experimental results demonstrate that a statistically guided program can produce correct parsings even with a grammar involving extreme overgeneralization, that strategies exist for producing these parsings efficiently, and that these strategies can be developed automatically from a training sequence of sentences and their correct parsings.

SOCIAL SCIENCES

PB 162 757 OTS $7.60

Ohio State U. Research Foundation, Columbus.
THE JAPANESE LABOR BOSS SYSTEM: A DESCRIPTION AND A PRELIMINARY SOCIOLOGICAL ANALYSIS, by Iwao Ishino and John W. Bennett. Interim technical rept. no. 3 on Japanese Social Relations, Contract Nonr-49503. June 52, second edition Apr 53, 77p. 15 refs. RF Proj. 483; AD-31 249.

DESCRIPTORS: *Sociology, *Labor, *Japan, Industrial relations, Culture.

In 1947 Allied newspaper correspondents became aware of a sub rosa organizational system linking men in high political positions with disreputable characters in the underworld and with purged ex-military and ex-government leaders. On the basis of interviews, sociological surveys, and a review of the literature, a generalized description and a preliminary theoretical interpretation were attempted of this "oyabun-kobun" system as it is manifested in the "labor boss" system. The different institutional settings in which the oyabun-kobun patterns appeared were designated. The relationship of these patterns and the labor boss organizations were indicated in descriptions of the various ceremonial elements and patterns of human relationships and of social organizations of the labor boss system. Case studies are presented of specific types of labor boss organizations: the dormitory group, the kumi clique, and the kumi council Interpretations are given for the persistence in modern Japan of these organizational groups with their feudalistic and nonrational characteristics. (ASTIA abstract)

PB 162 758 OTS $6.60

Ohio State U. Research Foundation, Columbus.
SOME ASPECTS OF JAPANESE FORESTRY ECONOMY: TWO CASE STUDIES, by John W. Bennett. Interim technical rept. no. 5 on Japanese Social Relations, Contract Nonr-49503. Apr 53, 62p. 7 refs. RF Proj. 483; AD-20 528.

DESCRIPTORS: *Sociology, *Japan, *Forestry, *Economics, Culture, Labor, Leadership.

Case studies are presented concerning social customs relating to the function of skid trails (important to forestry cutting practices) in the Japanese forestry economy and the role of boss-type heirarchical relationships between men involved in the forestry operation. Conditions and pressures causing the wasteful forest exploitation included overpopulation, postwar reconstruction, fluctuations in the outside timber market, and various aspects of the social organization and culture of the forest economy. Data were obtained largely from interviews of selected respondents by Japanese sociologists. (ASTIA abstract)

PB 162 759 OTS $9.60

Ohio State U. Research Foundation, Columbus.
TYPES OF THE JAPANESE RURAL COMMUNITY: A PRELIMINARY STUDY OF VARIATION IN DEMOGRAPHY, ECONOMY, SOCIETY, by Iwao Ishino and John W. Bennett. Interim technical rept. no. 6 on Japanese Social Relations, Contract Nonr-49503. Sep 53, 114p. 39 refs. RF Proj. 483; AD-52 585.

DESCRIPTORS: *Sociology, *Rural areas, *Japan, Population, *Economics, Culture.

This report consists of a re-analysis of portions of the data collected by a research team in Japan in 1947-48. The objective of the present report is to utilize data from thirteen carefully-selected, representative communities for the tentative construction of types and empirical generalizations about variation and co-variation in demographic, economic, and social factors. This report, in its stressing of certain demographic and economic imperatives of the Japanese rural community, provides a suggestive basic for interpretations of the typical Japanese socio-economic groupings, like the dozoku, the oyabun-kobun system, and the "community boss."

Documentation

PB 181 474 OTS $2.25

Battelle Memorial Inst., Columbus, Ohio.
A GUIDE TO THE SCIENTIFIC AND TECHNICAL LITERATURE OF EASTERN EUROPE, comp. by Beverly A. Rawles and Inez B. Wheldon. Oct 62, 99p. 440 refs. NSF-62-49.

DESCRIPTORS: *Documentation, Scientific reports, Dissemination, Libraries, *Europe, Translation, Periodicals.

The purpose of this publication is to provide a guide to the scientific and technical literature of Albania, Bulgaria, Czechoslovakia, Hungary, Poland, Rumania, and Yugoslavia. It is intended for use by scientists, librarians, and students. It contains information on the announcement, availability, procurement and translatior of East European publications in the physical, biological and certain of the social sciences. Medicine (except experimental medicine) and agriculture are excluded.

PB 162 725 OTS $2.60

Pennsylvania State U. Coll. of Chemistry and Physics, University Park.
AN EXAMPLE OF AN AUTOMATIC TABULATION OF THE GROTH INSTITUTE ABSTRACT IBM CARDS IN VARIOUS CATEGORIES, by R. Pepinsky and V. Vand. Rept. no. 6 on Contract AF 49(638)416. 2 Apr 58, 28p. [AFOSR TN-59-1050]; AD-228 888.

DESCRIPTORS: *Documentation, *Abstracts, Coding, *Data processing systems, *Punched cards, Crystals, Solid state physics, Information retrieval.

Automatic tabulation of the Groth Institute abstract IBM cards according to authors, properties, etc., is described which serves as another example of types of machine output. This tabulation contains too few entries to be really useful; several books have to be covered in order to obtain collations of real value. A list of abbreviations precedes the categorized tabulations. Several points are of interest. In the author index; the continue column reveals whether a single author was mentioned, or whether the reference has joint authors. In the former instance, the continue column is blank (example, 1200 AUT Bolland); in the latter instance, it reveals the order in the joint authorship (example, 3090 AUT3 Berry reveals that Berry is the third joint author). In the formula index, the style is not completely stabilized, especially for hydrates. The final formula style to be adopted will depend on the convenience of control of the upper and lower case of the Cardatype machine. It is likely that a comma instead of a period will be used to separate the water of hydration; otherwise the number of water molecules will be printed as subscripts, which is undesirable. (Author)

PB 162 722 OTS $1.60

Pennsylvania State U. Coll. of Chemistry and Physics, University Park.
SPECIFICATIONS FOR THE GROTH INSTITUTE IBM 704 PROGRAMS, by V. Vand and R. Pepinsky. Rept. no. 23 on Contract AF 49(638)416. 23 Mar 59, 12p. AFOSR TN-59-236; AD-228 916.

DESCRIPTORS: *Documentation, *Programming (Computers), Specifications, Data processing systems, Punched card methods, Solid state physics, Information retrieval.

PB 162 724 OTS $1.10

Pennsylvania State U. Coll. of Chemistry and Physics, University Park.
SUGGESTED AGREEMENT FORM FOR CORRESPONDING MEMBERS OF THE GROTH INSTITUTE, by R. Pepinsky and V. Vand. Rept. no. 9 on Contract AF 49(638)416. 1 May 58, 8p. [AFOSR TN-59-1053]; AD-228 890.

DESCRIPTORS: *Documentation, Research program administration, Abstracts, Preparation, Data processing systems, Solid state physics.

PB 162 723 OTS $1.10

Pennsylvania State U. Coll. of Chemistry and Physics, University Park.
SUMMARY REPORT ON THE GROTH INSTITUTE, by Ray Pepinsky. Rept. no. 36 on Contract AF 49(638)416. 21 Oct 59, 9p. AFOSR TN-59-1231; AD-228 902.

DESCRIPTORS: *Documentation, Solid state physics, *Information retrieval, Data processing systems.

The Groth Institute, established in March, 1958, has as its purposes the development and continuing practical operation of a system of information retrieval and publication in the field of solid state chemistry and physics, and the preparation of an encyclopedia of chemical and physical crystallography, based on the design of Paul von Groth's Chemische Krystallographie, but including all available and calculable information on solid state materials.

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